INSTITUTIONAL MODELS FOR CARBON FINANCE TO MOBILIZE SUSTAINABLE AGRICULTURAL DEVELOPMENT IN AFRICA

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ACRONYMS

AFOLU	Agriculture Forestry and Other Land Uses
AGRA	Alliance for a Green Revolution in Africa
ASB	Partnership for Tropical Forest Margins
CAADP	Comprehensive Africa Agriculture Development Programme
CCI	Cocoa Carbon Initiative
CDM	Clean Development Mechanism
COMACO	Community Markets for Conservation
COP	Conference of the Parties
DRC	Democratic Republic of Congo
EU ETS E	European Union Emission Trading Scheme (EU ETS)
GBM	Green Belt Movement
GEF	Global Environmental Facility
GHG	greenhouse gas
ICRAF	World Agroforestry Center
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
MCLT	Mozambique Carbon Livelihoods Trust
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Action
NGO	Non-governmental Organizations
PES	Payments for Ecosystem Services
REDD	Reduced Emissions from Deforestation and Degradation
SALM	Sustainable Agriculture Land Management
SLM	Sustainable Land Management
TIST	The International Small Group Tree Planting Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VCS	Voluntary Carbon Standard

EXECUTIVE SUMMARY

If there is a silver lining to the storm cloud of climate change for Africa's small farmers, it is the potential for them to participate in international climate change mitigation markets that have emerged in recent years. With supportive policies and skillful project development, these markets have the potential to catalyze climate-friendly and resilient smallholder agricultural development in Africa. This project aimed to examine the ways that agricultural greenhouse gas (GHG) markets are developing in Africa to support livelihoods of small farmers and the agroecosystems that they manage and to suggest ways to strengthen the institutions upon which these projects will be built in the future. Our definition of agriculture projects includes those in which farmers benefit from GHG mitigation markets. So, in addition to sequestration and emission reduction projects on working farm and pasture land, we have included forestry projects in which farmers are the primary "sellers" of credits.

The project had three primary objectives. The first was to develop an inventory of agricultural GHG mitigation projects in sub-Saharan Africa. The analysis of the inventory includes a basic characterization of the elements of project design, with special attention to their institutional arrangements. Eighty-one projects in 24 countries were identified. A roughly equal number of projects were in the initial planning phases (33%) as those in which money was exchanged (36%). Developers had reached the stage of completed project plans in 14%, and in 10% sequestration or emission reduction practices have been put in place but no money has been exchanged. In 8% of the projects, where practices were in place, we were unable to establish, based on our information, whether money had actually been exchanged.

On mitigation practices, a roughly equal number of off-farm rehabilitation projects and on-farm farm sequestration projects were found. Some 30% included off-farm rehabilitation practices within agroecosystems as the sole means of sequestration. However, when included with multi-intervention projects, this rises to 53%. About 29% are on-farm sequestration projects, rising to 51% when combination projects are included. Some 7% were solo Reduced Emissions from Deforestation and Degradation (REDD) projects, 16% when including combinations. About 8% projects fell into a miscellaneous category – 9% when including combinations – that included emission reduction projects such as nitrogen fertilizer reduction and methane capture.

The survey included institutional questions on developers/investors, field program managers, sellers, buyers, land tenure status. and support services from other intermediaries. Details on institutional arrangements were often difficult to come by, but we collected sufficient information for a quantitative analysis on developer/investor type and field program manager type. Filling the developer/investor role, there were 11 different kinds of organizations represented. Roughly a third of them featured developer/investor arrangements in which multiple types of organizations collaborated to fill the role. The leaders in this group were multilateral/bilateral donors and carbon developers. In 19% of the cases, the multilateral/bilateral donors filled the role on their own; this share rose to 41% when the combination cases were included. Carbon developers filled the role 20% of the time on their own and 29% with combinations included.

For field program managers, there were 10 types of actors, mostly overlapping with those of the developer/investor types. The types were broadly distributed mostly between carbon developers (23%), private non-carbon businesses (21%), local/national NGOs (21%), and international environmental NGOs (19%). The report includes qualitative findings on farmer's organizations, Technical service providers for carbon projects and Sustainable Land Management (SLM) technical service and advice providers.

The second objective of the report is to synthesize lessons from the inventory to identify institutional gaps that are hampering the success of these projects and possible interventions to overcome them. These needs include low transaction costs, risk management for farmers, secure land tenure and carbon rights, sufficient incentives for farmers to participate, access to financing for farmers and project developers, project management and implementation capacity, and sufficient demand for agricultural credits.

Finally, based on the inventory and the institutional needs analysis, recommendations are offered regarding roles for various sectors and organizations, including USAID, to fill these gaps. Roles for national governments, community organizations, local and national non-governmental organizaitons (NGOs), research institutions, international donors, and the private sector are considered.

AGRICULTURAL CARBON MARKETS IN AFRICA

CLIMATE CHANGE AND AGRICULTURE IN AFRICA

African farmers will face severe pressure from climate change. Rising temperatures and shifting and unreliable precipitation patterns will exacerbate existing vulnerabilities to land degradation, floods, and drought in Africa and will challenge farmers to make major changes in farming systems. A third of the people in Africa already live in areas prone to droughts facing severe risks of food insecurity and famines.[1] Droughts will become more frequent in drylands, and rainfall higher in some rainforest regions, making food production even more difficult. With temperature changes, the growing season for crops may shrink by more than 20% in several countries in the continent. Crop yields may decline by 50% in some countries by 2020.[2] Climate change will also put ecosystems at risk, with over 4,000 African plant species projected to lose critical habitat, undermining the livelihoods of many Africans who depend on wild species for food, fuel, fodder and medicines.[3]

If there is a silver lining to the storm cloud of climate change for Africa's small farmers, it is the potential for them to participate in international climate change mitigation markets that have emerged in recent years. Soil and vegetation on the Earth's land surface store three times the carbon present in the Earth's atmosphere.[4] Land-clearing and degradation turn this valuable carbon sink into a major source of greenhouse gas (GHG) emissions. 43% of Africa's total CO_2 emissions come from land-clearing for agricultural use, including croplands and shifting cultivation.[5] Five million hectares of forest will likely be lost annually in Africa from 2005-2015, releasing nearly 2 billion tons of CO_2eq each year,[6] or 13% of annual global emissions from forestry and agriculture combined.[7] African topsoils are storing 316 billion tons of CO_2eq.[8] But with two-thirds of sub-Saharan Africa's cropland, rangeland, and woodland already degraded,[9] this stored carbon is being returned to the atmosphere.

By selecting among and adopting these management practices, where appropriate, African croplands could potentially reduce GHG emissions by 2.0–3.5 million tons of CO_2eq per hectare per year[10] or a total of 52.3–91.5 million tons of CO_2eq,[11] equal to 5-9% of annual African fossil fuel emissions in

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[1] Boko et al. 2007. Africa. In: Climate Change 2007 (IPCC, 4th Assessment Report)

[2] ibid

[3] ibid

[4] Scherr and Sthapit. 2009. Farming and Land Use to Cool the Planet. In: State of the World 2009: Into a Warming World (Worldwatch Institute)

[5] Canadell, Raupach and Houghton. 2009. Anthropogenic CO2 emissions in Africa. Biogeociences 6:463

[6] Sohngen, Beach & Andrasko. 2008.Avoided deforestation as a greenhouse gas mitigation tool: economic issues. Journal of Environmental Quality 37:1368-1375

[7] IPCC. 2007. Climate Change 2007: Synthesis (IPCC, 4th Assesment Report)

[8] Henry, Valentini and Bernoux. 2009. Soil carbon stocks in ecoregions of Africa. Biogeosciences Discussions 6:797-823

[9] Pender et al. 2009. The Role of SLM for Climate Change Adaptation and Mitigation in sub-Saharan Africa

[10] Smith and Martino. 2007. Agriculture. In: Climate Change 2007 (IPCC, 4th Assesment Report)

[11] www.faostat.fao.org

2005.[12] Even in semi-arid lands, agroforestry systems like intercropping or silvopasture, with 50 trees per hectare, can store 110 to 147 tons of CO_2eq per hectare in the soil alone.[13]

Clearly, there are ample opportunities to sequester carbon in land and to reduce GHG emissions. With supportive policies and skillful project development, carbon markets have the potential to catalyze climate-friendly and resilient smallholder agricultural development in Africa.

EcoAgriculture Partners has identified five key strategies for reducing and sequestering land-based greenhouse gas emissions:

- *Enriching soil carbon.* Agricultural soils can be managed to reduce emissions by minimizing tillage, reducing use of nitrogen fertilizers, and preventing erosion. Soils can store the carbon captured by plants from the atmosphere by building up soil organic matter, which also has benefits for crop production. Adding biochar (biomass burned in a low-oxygen environment) can further enhance carbon storage in soil.
- *Farming with perennials.* Perennial crops, grasses, palms, and trees constantly maintain and develop their root and woody biomass and associated carbon, while providing vegetative cover for soils. There is large potential to substitute annual tilled crops with perennials, particularly for animal feed and vegetable oils, as well as to incorporate woody perennials into annual cropping systems in agroforestry systems.
- *Climate-friendly livestock production.* Rapid growth in demand for livestock products has triggered a huge rise in the number of animals, the concentration of wastes in feedlots and dairies, and the clearing of natural grasslands and forests for grazing. A reduction in livestock numbers may be needed but production innovations can help, including rotational grazing systems, manure management, methane capture for biogas production, and improved feeds and feed additives.
- *Protecting natural habitat.* The planet's 4 billion hectares of forests and 5 billion hectares of natural grasslands are a massive reservoir of carbon – both in vegetation above ground and in root systems below ground. As forests and grasslands grow, they remove carbon from the atmosphere. Deforestation, land clearing, and forest and grassland fires are major sources of GHG emissions, in long-settled agricultural landscapes, as well as in the agricultural frontier. Incentives are needed to encourage farmers and land users to maintain natural vegetation through product certification, payments for climate services, securing tenure rights, and community fire control. The conservation of natural habitat will benefit biodiversity in the face of climate change.
- *Restoring degraded watersheds and rangelands.* Extensive areas of the world have been denuded of vegetation through land clearing for crops or grazing and from overuse and poor management. Degradation has not only generated a huge amount of GHG emissions, but local people have lost a valuable livelihood asset as well as essential watershed functions. Restoring vegetative cover on carbon at field scales for many diverse practices and components of the landscape (soils, grasses, trees, animal wastes, etc.), and methods for integrated landscape-wide carbon assessment will soon be available.

For farmers, the value of moving towards more of these climate-friendly practices can also include livelihood and agroecosystems co-benefits. For example, an International Food Policy Research Institute

[12] Canadell, Raupach and Houghton. 2009. Anthropogenic CO2 emissions in Africa. Biogeociences 6:463-468

[13] Nair et al. 2009.Soil Carbon Sequestration in Tropical Agroforestry Systems: a Feasibility Appraisal. Environmental Science and Policy (in press)

(IFPRI) study analyzed 41 sustainable land management interventions and, nearly all of them demonstrated significant yield increase, with 24 interventions showing a yield increase greater than 100%.[14] Another 45 sustainable land management interventions examined in sub-Saharan Africa found that cereal yields increased between 50% and 100% in almost all of the cases. Almost all of these land use practices also showed significant profitability for farmers.[15]

STATUS OF AGRICULTURAL CARBON MARKETS IN AFRICA

This growing body of research on the potential of these climate-friendly land management practices to simultaneously mitigate climate change and improve agricultural production in Africa has sparked interest among African policy makers, NGOs, farmers groups, and developers and buyers within the international carbon market to explore the potential to leverage carbon markets to support sustainable agricultural development.

Measured by volume, carbon markets are the largest type of environmental market in the world. In 2009, the value of global carbon market reached US$144 billion, up from US$135 billion in 2008 and US$63 billion in 2007.[16] Most of these transactions are taking place in regulatory markets, linked to cap-and-trade mechanisms imposed by governments. Unfortunately for Africa's farmers, regulatory carbon markets have historically focused on industrial and energy sectors. The European Union Emission Trading Scheme (EU ETS) – the world's leading regulatory scheme – excludes any type of land use carbon. The Kyoto Protocol limits the eligible Clean Development Mechanism (CDM) project classes in the land-use area to afforestation and reforestation, specifically excluding any crediting for agricultural or forest management, avoided deforestation or degradation, and soil carbon storage in developing countries. Further hampering growth of these project types, the CDM awards afforestation / reforestation activities only temporary carbon credits that have limited fungibility with other traded carbon credits. The effect of these rules is that land use projects generally are very rare in the CDM and agricultural projects have been limited to those that reduce methane and other emissions from agricultural wastes and those that decrease energy emissions in processing.

Consequently, most of the action in the carbon markets for farmers has taken place in the much smaller voluntary markets, in which companies and individuals operate without government-mandated obligations. Voluntary transactions can apply private standards or simply be based on the agreement between the transacting parties. These markets were valued at US$705 million in 2008, an 87% increase over 2007.[17] Current estimates of developing country land-based carbon projects are ~US$5 to US$10 million worldwide, mostly through the World Bank's BioCarbon Fund.[18] Voluntary markets have been supportive of land-based projects generally, and agricultural projects in particular, due to the proliferation of multiple certification standards that provide space for projects to serve as laboratories for agricultural project development and MRV (monitoring, reporting and verification). Most notably, within the Voluntary Carbon Standard (VCS), a new methodology – The Sustainable Agricultural Landscape Methodology (SALM) – is close to completing the VCS's double certification process. The World Bank BioCarbon Fund is aggressively seeking out projects to apply this new methodology, particularly in Africa. For agribusinesses working through their supply chains, the Rainforest Alliance is

[14] Pender, J. December 2008. The World Food Crisis, Land Degradation and Sustainable Land Management: Linkages, Opportunities and Constraints. International Food Policy Research Institute.

[15] Pretty, J.N., A.D. Noble, D. Bassio, J. Nixon, R.E. Hine, F.W.T. Penning de Vries, and J.I.L. Morison. 2006. Resource conserving agriculture increases yields in developing countries. Environmental Science and Technology 40(4): 1114-1119.

[16] World Bank. State and trends of the carbon market 2010. Washington, DC: Carbon Finance at the World Bank.

[17] Hamilton, K., M. Sjardin, A. Shapiro, T. Marcello. 2009 State of the Voluntary Carbon Markets: Fortifying the Foundation. Ecosystem

[18] Newcombe, K. Soil and Agro-ecosystem Carbon: Markets and Opportunities. Rural Week, World Bank. March 3, 2009.

developing a Climate Module which can be added to the monitoring of other products already receiving their certification.

Although land-based projects are growing within the voluntary markets, Africa has lagged behind. As of February 2010, only 19 CDM projects had been registered in Africa through the CDM. In voluntary markets, Africa represents only 11% of total forest carbon transactions.[19] Far fewer of these have been agricultural projects, employing sustainable agricultural land management.

Despite the low number of land use projects, momentum has been building around the REDD agenda. A May 2010 agreement, concluded in Oslo, Norway, has promised $4.5 billion of support to developing countries to build capacity in their REDD programs. While there are certainly cases in which farmers can benefit from REDD, few African countries stand to benefit from climate finance that focuses exclusively on forests. Far more African land is characterized by heterogeneous agricultural landscape mosaics. Africa needs opportunities to develop projects that utilize climate-friendly, sustainable land management systems that will improve agro-ecosystem quality over time, and thus farmers' livelihoods. There are some signs that this is beginning to happen.

Within international climate policy discussions the profile of agriculture has been rising. In Copenhagen in December 2009, at COP-15, an Agriculture and Rural Development Day was organized alongside a United Nations Framework Convention on Climate Change (UNFCCC) meeting to highlight agriculture and climate change connections. In another substantial step forward, 21 countries pledged US$150 billion to a Global Research Alliance on Agricultural Greenhouse Gases. COP-15 also drew the forest and agriculture carbon work more closely together. A joint side event was held to report on the outcomes of Forest Day and Agriculture and Rural Development Day and make a joint statement about a common vision for future land use and climate change work.[20] Although the forestry and REDD agenda remains more advanced than agriculture, particularly the conclusion of the Oslo agreement, there is evidence that agriculture is rising on the agenda and that forestry/REDD frames may soon broaden to include agriculture.

The growing interest in agricultural carbon heard at the UNFCCC meetings is also being voiced by African governments, NGOs, and donors as they move to support an agricultural GHG agenda. In Africa, some national governments are establishing carbon policy positions and in some cases creating new governmental initiatives to develop and oversee them. Conservation and development NGOs have been stepping into the carbon project domain.

At the same time, there has been an increase in the level of support for sustainable agricultural land management activities in sub-Saharan Africa in recent years. Though most of these new investments were not originally designed for carbon mitigation projects, they have the potential to be leveraged to create a sizeable pipeline of potential projects. For example, US$1 billion has been earmarked by the Global Environment Facility's (GEF) for Sustainable Land Management in sub-Saharan Africa under the Comprehensive Africa Agriculture Development Programme (CAADP). The TerrAfrica Platform's Country Flagship Program for Climate Change, Land and Water is building on these resources and channeling grants directly to land-based climate change mitigation and adaptation activities.

Outside of the multilateral entities, USAID has been making substantial investments in African agricultural development and climate change and other bilaterals – such as the Norwegian Government's support of conservation tillage and agroforestry in Zambia – are following similar trends. In the private

[19] http://moderncms.ecosystemmarketplace.com/repository/moderncms_documents/SFCM.pdf

[20] The side event was titled: "Beyond Copenhagen: Agriculture and Forestry Are Part of the Solution." For further information, please see: http://www.donorplatform.org/content/view/348/210

foundation realm, the Alliance for a Green Revolution in Africa is investing throughout the agricultural value chain on seeds, soil health, market development, agricultural education, and policy and is committed to increasing this amount over the coming years. Concurrent with growing sustainable agriculture efforts, African governments have been investing a greater portion of national budgets into agriculture following on a commitment made in 2003 that at least 10% of total budgets would go to agriculture over the next five years, which has been partially realized.

Agribusiness with African supply chains are also likely to explore the potential of engaging with African carbon projects. These businesses could gain a "triple win" by investing in agricultural carbon projects that would "decarbonize" supply chains, introduce greater adaptability to climate change, and enhance the brand among key in-region suppliers. The opportunity is not only one of engaging with agribusiness as prospective buyers of credits or offsets, but also potentially establishing themselves as an incentive mechanism for farmers if agribusiness adds carbon-friendly sustainable land management protocols to lists of recommended grower practices. Companies also offer a technical assistance delivery mechanism for farmers, giving regular corporate trainings of farmers in recommended agricultural practices. These possibilities are most likely with companies engaged in other sustainable agriculture initiatives, such as Sustainable Agriculture Initiative Platform, which includes Nestle, Unilever, Group Danone, McDonald's, Coca Cola, Kellogg's, General Mills, and others.

INSTITUTIONAL CHALLENGES FOR AGRICULTURAL CARBON MARKET DEVELOPMENT

But even as rules change, donors invest and potential buyers emerge, the nature of agricultural GHG projects, and the involvement of vulnerable small farmers, who are often politically marginalized, presents challenges for project design and implementation. Projects need streamlined approaches to reduce transactions costs, they need protection against exploitation by other actors in the carbon supply chain, and when these conditions are met, they need the technical and organizational capacity to implement and manage these projects. This is particularly true in Africa which has relatively weak agricultural development and environmental institutions.

This project aimed to examine the ways that agricultural GHG markets are developing in Africa to support livelihoods of small farmers and the agroecosystems that they manage and to suggest ways to strengthen the institutions upon which these projects will be built in the future. It had three primary objectives. The first was to develop an inventory of agricultural GHG mitigation projects in sub-Saharan Africa. The projects in the inventory include a basic characterization of the elements of project design, with special attention to their institutional arrangements. The second objective was to synthesize lessons from the inventory to identify institutional gaps that are hampering the success of these projects and possible interventions to overcome them. Finally, based on the inventory and the institutional needs analysis, recommendations have been made regarding roles for various sectors and organizations, including USAID, to fill these gaps.

INVENTORY FINDINGS: AGRICULTURAL CARBON PROJECTS, IMPLEMENTATION STATUS AND SEQUESTRATION PRACTICES

INVENTORY METHODOLOGY

The goal in developing this inventory of agricultural GHG projects in sub-Saharan Africa was to ascertain a sense of the number of projects ongoing, those under development, the scale of these projects, the practices that they are employing, and who is playing the key institutional roles. First, we worked to define the boundaries of the inventory.

We began by studying previous inventory work on closely related topics and documents from organizations that have been on the forefront of agricultural GHG project development.Key sources in this group included a Winrock International and FAO survey on "Carbon market opportunities for the forestry sector in Africa."[21] In this document, *forestry* refers to the widely used carbon market framing of AFOLU (agriculture, forestry and other land use) The World Agroforestry Centre (ICRAF) produced an inventory in 2009[22] of *biocarbon* projects – essentially the same framing as AFOLU – as part of their African Biocarbon Initiative. This inventory was a desk study and cited the Winrock report in many of its entries. The group also produced a policy brief that synthesized lessons from the unpublished inventory.[23] The Katoomba Group has also compiled a series of country specific inventories for Malawi, Kenya, Madagascar, Tanzania, Uganda, and South Africa, respectively – most recently updated in 2008 – but these were focused broadly on payments for ecosystem services (PES),[24] including the full range of carbon projects as well as watershed and biodiversity initiatives. These inventories were an important input for the previously noted inventories as well as this one.

The AFOLU framing used in the Katoomba report, very close to the meanings of the words *terrestrial* and *biocarbon,* are useful when viewing these projects primarily from a sequestration perspective. These terms refer to projects where carbon is being sequestered in, above or below ground biomass, anywhere

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[21] Walker, S, T. Pearson, P. Munishib, and S. Petrova. 2008. Carbon market opportunities for the forestry sector of Africa Winrock International, and FAO between Winrock International and FAO in support of the 16th Session of the African Forestry and Wildlife Commission, Khartoum, Sudan.

[22] Chomba, S. and P.A. Minang. 2009 unpublished. Inventory in support of the African Biocarbon Initiative.

[23] Chomba S, P.A. Minang PA. 2009. Africa's biocarbon experience: Lessons for improving performance in the African carbon markets. World Agroforestry Centre Policy Brief 06. World Agroforestry Centre, Nairobi, Kenya. http://www.worldagroforestry.org/downloads/publications/PDFs/africa-biocarbon-experience.pdf

[24] Links To These Studies Can Be Found At Http://Www.Katoombagroup.Org/Regions/Africa/Assessments.Php

in any landscape. This project, however, was interested in *agricultural* GHG projects. This category covers a subset of AFOLU projects in which GHGs are sequestered within agricultural production systems, as well as GHG emission reduction projects on farms through mechanisms including biogas digesters and nitrogen fertilizer reduction schemes. Within the *agricultural* grouping, we were most interested in projects in which farmers were implementing climate-friendly agricultural practices that also provide livelihood and ecosystem service co-benefits. We hypothesized that the institutional issues faced in agricultural projects may be distinct from many reforestation/afforestation and avoided deforestation projects, although lessons from these experiences would certainly be applicable in agricultural contexts.

After our initial round of scanning the literature, however, we found that there were very few projects in Africa taking place entirely on working farmland. Consequently, we decided to expand our definition of *agriculture* projects to those in which farmers benefit from GHG mitigation markets. So we have also included forestry projects in which farmers are primary the "sellers" of credits.

With this revised definition, and the results of our initial desk study, we worked with our three consultants, to help us dig deeper into the inventory by filling informational gaps in previously identified projects and by tracking down additional projects. Each consultant was also tasked with developing short case studies that allowed us to more closely examine successful institutional elements within certain projects. These cases were integrated into the analysis in this report and they are also attached as separate documents as Annexes 1 through 5.

The inventory survey included questions designed to characterize the projects generally, and also to delve particularly into the institutional arrangements for these projects. The full inventory is attached as Annex 6. For the analysis in this report, the projects have been characterize based on carbon-generating activity, implementation status, types of project developers, and types of field program managers. We also use the collected information to diagram the institutional roles in a carbon project from a farmer's perspective, to focus thinking on how farmers might perceive a GHG project and which institutional actors are critical in order for these projects to work for farmers.

IMPLEMENTATION STATUS

In total, we identified 81 projects in 24 countries for the inventory. These entries came with varying levels of information, and we left out a number of probable projects in cases where we were unable to ascertain basic pieces of information. We were able to identify the implementation status of 73 of the projects (See Table 1.) We found a roughly equal number of projects that were in the initial planning phases (24 projects or 33%) as those in which money was exchanged (26 projects or 36%). Most of the projects that we left out of the inventory because a lack of information would have fallen into the initial scoping category. We found 10 projects (14%) in which developers had completed project plans, seven (10%) where sequestration or emission reduction practices have been put in place and no money has been exchanged, and six cases (8%) where practices were in place, but, based on our information, we were unable to establish whether money had actually been exchanged.

Table 1. Project implementation status (n=73)

Implementation stage	Total number	% of total with information
Still in scoping/planning	24	33
Project plan developed	10	14
Practices in place, but no money exchanged	7	10
Money exchanged	26	36
Could be either practices in place or or money exchanged, but information was insufficient to determine	6	8

SEQUESTRATION PRACTICES

These projects include the full spectrum of land based carbon sequestration and agricultural emission reduction practices. (See Table 2) We grouped them into four general categories: 1) off-farm rehabilitation; 2) on-farm tree-planting, agroforestry agricultural soil management; 3) REDD; and 4) miscellaneous emission reduction. In 20 of the 74 projects in which we are able to identify the sequestration practice or emission reduction practice, more than one of these categories was represented. Of the 74 projects there were roughly equal numbers of off-farm rehabilitation projects and on-farm sequestration projects. 22 projects (30%) included off-farm rehabilitation practices within agroecosystems as the sole means of sequestration. But when included with multi-intervention projects, this number rises to 39 projects (53%). There are 21 on-farm sequestration projects (29%) and 38 (51%) when combination projects are included. The inventory also included five solo REDD projects (7%) and 12 (16%) when including combinations. 6 (8%) of projects fell into a miscellaneous category – seven (9%) when including combinations – that included emission reduction projects such as nitrogen fertilizer reduction and methane capture.

Table 2. GHG mitigation activities (n=74)

Mitigation activity	% of projects implementing activity alone	% of projects implementing activity alone and in combination with others
Off-farm land rehabilitation with benefits to farmers	30	53
On-farm practices-tree planting, agroforestry agricultural soil management	28	51
REDD with benefits to farmers	7	16
Miscellaneous emission reductions (biodigesters, green charcoal, reducing N20 emissions from fertilizers)	8	9

Of the land rehabilitation projects within agro-ecosystems, the incentive for farmers to participate in these projects is, in some cases, a direct payment to plant trees or to protect certain areas for rehabilitation. Communities may also benefit from these projects if they have collective rights to the land that is generating carbon credits. In these cases individual farmers may get a small direct carbon credit payment. The primary benefit of these projects to communities in the long-term, however, will be the agricultural improvements in soil quality and water availability from the rehabilitated agro-ecosystem.

These regeneration projects also have the potential to be registered as CDM projects. The first project in this class (afforestation/reforestation) in Africa to be registered under the CDM is the Humbo Assisted Regeneration project in Ethiopia. In this case, local community groups will be receiving carbon payments directly, and they will also benefit from agro-ecosystem restoration, particularly from improved water quality and quantity from nearby springs and streams. Another example is the PRESAL (Restoration of lands in the Senegal groundnut basin) in which the primary objective is to reclaim for productive agriculture 15000 ha of badlands affected by salinization.

For on-farm activities, so far, tree planting projects have been the most popular. Farmers plant the trees on their farms, either in woodlots or as elements of an agroforestry system, and usually get paid based on the number of trees planted. Some of these projects are linked with broader conservation initiatives in which the planting of indigenous trees is linked to either ecosystem conservation or land rehabilitation. The Greenbelt Movement project in Kenya is an example of this. In other cases, such as the International Small Group Tree Planting Program (TIST) projects, ecological context is less important as non-native species tend to be planted along the edges of farms regardless of the location of the farm.

With the development of new agricultural methodologies within the VCS, particularly the SALM, projects are beginning to emerge that build above and below ground carbon within production systems by utilizing agroforestry and reduced tillage techniques. The Western Kenya Smallholder Agricultural Carbon Finance project is the most advanced example of this kind of project, with others in the pipeline, particularly in Kenya and Zambia.

REDD projects were included in this inventory when farmers were found to be direct beneficiaries. An example of an agricultural livelihood/REDD project is the Nyamkamba Escarpment project in Ghana. The Nyankamba Community Resource Management Area is a proposed 240,000 hectare community protected area, proposed in the Ghanaian savannah/woodland transition zone, with approximately 4,000 inhabitants in eight communities. Although this is essentially a REDD project, a core goal is to promote sustainable alternative land uses for the local communities, including sustainable farming and charcoal production, forest management, sustainable harvesting of the non-timber forest products (mostly shea nuts), environmental education, social and health programs, and ecotourism.

Agricultural emission reduction projects in the inventory consist of bio-digester, nitrogen reduction, and renewal energy projects. The Senegal Green Charcoal Project is an example of these emissions reductions projects. It pays farmers to replace the wood charcoal and fuelwood used for domestic fuel with green charcoal, an alternative household fuel obtained from the clean carbonization of renewable biomass, such as agricultural residues or invasive weeds.

Twenty of these projects fell into multiple categories. The Ibi Bateke Carbon Sink Plantation in the Democratic Republic of Congo (DRC) is a sequestration and GHG reduction project. It will convert natural grassy savanna, disturbed by human-initiated fires, into an abundant and sustainable fuelwood supply for charcoal production. Carbon sequestration from the atmosphere is combined with a reduction in GHG emissions, resulting from the disappearance of savanna fires and the energy switch to non-fossil fuel.

As time goes on, it seems that agriculture GHG projects are becoming more able to include multiple interventions within a landscape. Early projects often highlighted simple tree planting, but as agricultural methodologies continue to develop and MRV systems become more sophisticated, carbon projects can be more easily integrated into agriculture landscape planning processes and larger conservation and rural development initiatives.

FINDINGS AND ANALYSIS ON INSTITUTIONAL ARRANGEMENTS

The goals of this inventory were to document the institutional arrangements of agricultural GHG projects, to use these findings to analyze projects' current strengths and weaknesses, and to identify future points for intervention that will help them succeed. To learn how these projects are organized, the inventory survey included questions on developer/investor type, field program managers, sellers, buyers, land tenure status, and support services from other intermediaries. With the information gathered in these categories, we have created a diagram of the institutions involved in an agricultural GHG project and offered examples of groups that play each role. (See Figures 1 and 2.) The diagram is not intended as an exhaustive map of all institutional actors with carbon projects, but rather aims to capture the perspective and interests of farmers within a complicated network of actors. It is designed to represent the central position of farmers within this system and show how a farmer might see and interact with other actors within a GHG project. This section will describe each of the roles represented in the diagram and, based on findings of the inventory, how they are being filled.

Figure 1. A farmer's view of agricultural GHG project institutions: Key actors & their functions

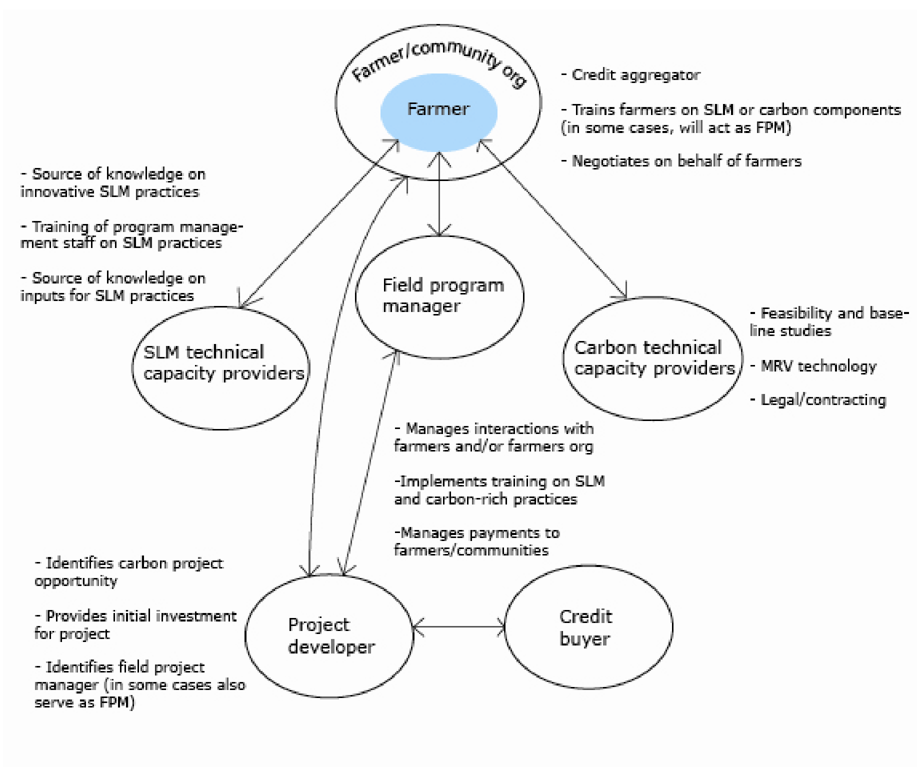
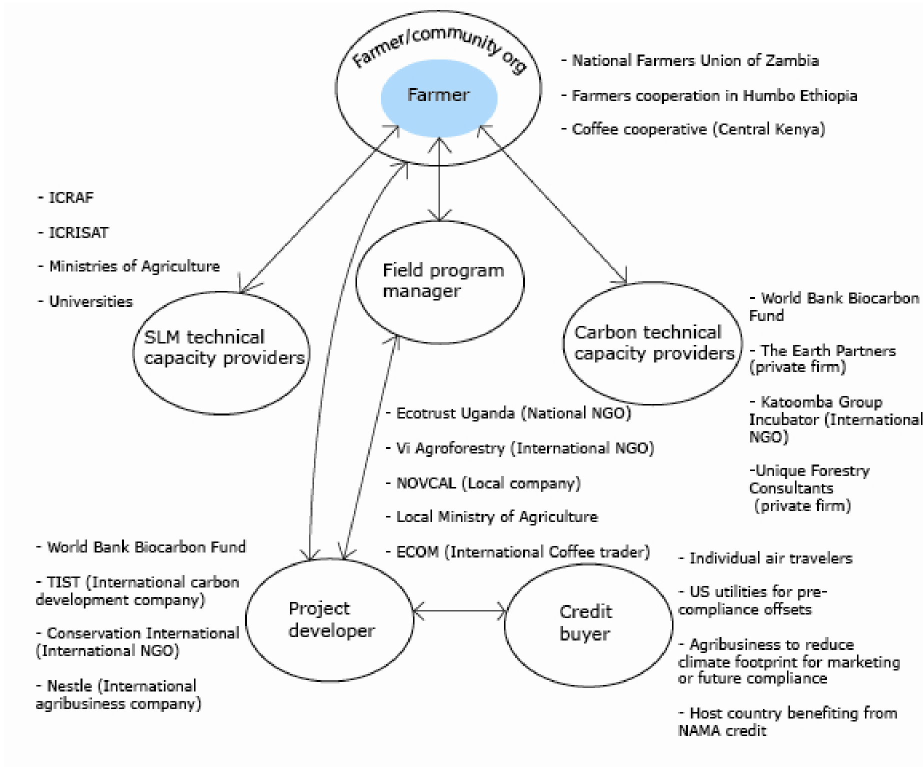


Figure 2. A farmer's view of agricultural GHG project institutions: Examples of key actors



Details on institutional arrangements were often difficult to come by for the inventory. However, we collected sufficient information for a quantitative analysis on two institutional elements: developer/investor type and field program manager type.

DEVELOPER/INVESTOR

The developer/investor is the party that initiates the project and provides the upfront capital to get it off the ground. For agricultural projects in Africa, this role is played by a highly diverse set of actors across sectors. Filling the developer/investor role, there were 11 different kinds of organizations represented among the 59 projects for which we had sufficient information. Roughly a third of them featured developer/investor arrangements in which multiple types of organizations collaborated to fill the role. The leaders in this group were multilateral/bilateral donors and carbon developers. In 19% of the cases the multilateral/bilateral donors filled the role on their own; this share rose to 41% when the combination cases were included. Carbon developers filled the role 20% of the time on their own and 29% with combinations included. (See Table 3.)

Among NGOs, conservation groups seem to have been the early actors, although lately, development organizations have become more interested. In the private sector, carbon developers have been key actors since the beginning, and their experience, along with the growing sophistication of other actors, has improved their opportunities for collaboration and allowed them to consider the ways that they can maximize the co-benefits of carbon projects. Non-carbon private companies, most notably agribusiness, forestry, and energy companies have begun to play a larger role recently. As governments observed the early projects, and participated in the international climate change discourse, they have also begun to appreciate the opportunities of agricultural carbon. Donors continue their strong support. The most important among these has been the World Bank BioCarbon Fund, which has spearheaded the development of the SALM methodology within the VCS and has offered to buy the credits from these early agricultural projects and provide technical support.

Table 3. Project developer/investor types (n=59)

Institutional types	% when acting alone	% when working alone and in combination
Private carbon developer	20	28
Multilaterial/bilaterlal donor	19	41
Private business, not primarily carbon	10	15
International environmental NGO	8	24
International development NGO	8	10
Private foundation	0	3
Research institution	0	8
Local/national government	0	2
Local/national company	0	2

FIELD PROGRAM MANAGERS

The field program manager is the entity that runs the day-to-day operations of a project. This must be a strong, on-the-ground organization with a fairly long time horizon, able to engage with farmers and farmer organizations, negotiate contracts, manage transactions of carbon payments to farmers (where this is done), and aggregate the carbon credits generated, provide technical assistance to farmers on sustainable land management practices that produce carbon offsets and co-benefits, facilitate landscape- and farm-scale greenhouse gas monitoring, and implement field measurements of carbon with farmers. A wide range of actors now plays this role in agricultural GHG projects in Africa.

The inventory found 10 types of actors, mostly overlapping with those of the developer/investor types. In only two cases were there projects with multiple field program managers. The types were also more broadly distributed within the 52 projects in which we had sufficient information, mostly between carbon developers (23%), private non-carbon businesses (21%), local/national NGOs (21%), and international environmental NGOs (19%). There were only two cases where combination field program manager arrangements were found. They both involved government agencies. (See Table 4.)

Table 4. Field program manager types (n=52)

Field program manager types	% of total
Carbon developer	23
Private non-carbon business	21
Local/national NGO	21
International environmental NGO	19
International development NGO	10
National government agency	4
School	2

An illustrative example of how a carbon developer plays the field program manager role is the case of the Sofala Community Carbon project in Mozambique. Associação Envirotrade Carbon Livelihoods is the field program manager. It is technically a Mozambique NGO, but is essentially a local subsidiary of Envirotrade Group, and international carbon developer based in Mauritius. The organization is in charge of managing the project's day-to-day operations, running the technical components, employing local staff, and managing relations with the local communities. In this case, Envirotrade Group has the responsibility to market the carbon offsets generated by the projects, negotiate the sale of the carbon offsets, raise additional finance where necessary, pay taxes on carbon offset sales, carry out research, and administer and develop new projects. In return, Envirotrade Group receives up to one-third of the proceeds of any carbon offset sales. Mozambique Carbon Livelihoods Trust (MCLT) is a trust fund established to manage the proceeds of the carbon sales. This vehicle protects the interests of the farmers and the local communities. Its board members include independent NGOs, the Community Association, Contabil (an auditing firm), and Associação Envirotrade Carbon Livelihoods.

When NGOs act as program managers, they are often already established within a community and take on additional responsibilities on top of the core functions they already perform. In many cases, they are also experts in implementing the very same sustainable land management practices that can be leveraged to develop carbon projects.

The Green Belt Movement (GBM), a national Kenyan NGO, has been working with farmers to plant trees in the Aberdare mountains since 1977. With carbon finance, they can simply expand their activities. This group already has the benefits of credibility among the community and ecological knowledge of the area. The carbon project will be able to leverage a well-established network of tree nurseries and community groups in the region.

The Mali Acacia Senegal plantation project is a case in which a large private landowner acts as field program manager and project developer. The project will reforest 6,000 ha. Of this, 3,000 ha is private land owned by the Déguessi Groupe, a Malian private producer and importer/exporter of agricultural products. The other 3,000 ha will be developed by local communities on communal land under a partnership agreement with the Déguessi Groupe. The company has signed sub-project agreements with the communities to commercialize the carbon credits on their land. It will develop and manage nurseries, contribute to farmers' training and assistance for planting trees, maintain plantations, and harvest Arabic gum. The project will also re-introduce agricultural activities through intercropping with groundnuts and cowpeas.

In the Kenya Smallholder Coffee Carbon Project, ECOM, an international coffee trading company, is overlaying a carbon component on its existing supply chain. A similar model is envisaged by the creators of the Cocoa Carbon Initiative (CCI), a venture of the international NGO Katoomba Group and the Nature Conservation Research Center (NCRC) to identify promising Cocoa projects and then to provide incubator support to develop them.

FARMER ORGANIZATIONS

Farmers and their organizations need the capacities to operate competently and, when appropriate, shrewdly as sellers. They need the capacity to plan and negotiate their own commitments for a carbon project, to implement sustainable land management practices at farm and landscape-scale, and to participate in the monitoring of carbon sequestration and emissions reductions. There are a variety of ways that the inventory found in which they are organizing to fill these needs.

In some cases agricultural carbon sellers were members of cooperatives or producers organizations that pre-dated the carbon project. In others, new farmers groups were created by the field program managers. In the Cocoa Carbon Initiative, the operative farmers' organizations are cooperatives of small cocoa growers, including the Kaupa Kkoo and the Cocoa Abrabapa cooperatives that represent a total of 1.2 million farmers. These farmers already have experience with Fair Trade certification and meeting buyers' standards. They have a strong social network and are able to disseminate information and train farmers in new methods. The carbon benefit sharing plan for these projects would be that 50% of carbon payments would go to farmers and 50% would go to a community trust.

In the TIST projects, operating in Kenya, Tanzania and Uganda, farmer groups of 10-12 are created specifically for the purpose of contracting and interacting with the carbon project developer and field program manager, TIST. The payments go directly to the group based on the total number of trees planted by their members, and the benefits are then distributed among members of the group as they see fit.

TECHNICAL SERVICE PROVIDERS FOR CARBON PROJECTS

Field program staff may need support from technical experts for training and/or back-stopping on carbon program feasibility studies; determining the most appropriate carbon friendly interventions; and carbon measurement, reporting, and verification. In addition, managers require legal advice and contractual expertise to ensure a fair deal between buyers and sellers to package offsets to buyers and to manage these transactions. They may also need help in identifying qualified consultants to provide these services. The inventory found that these services are being provided by a combination of outside private experts, international NGOs and donors, agribusiness, research institutions, and government agencies. Carbon technical capacity is still relatively limited in Africa and most of these services are still coming from the outside, often through actors interested not only in particular projects but in the broader goal of building African agricultural carbon markets. The World Bank BioCarbon Fund has played the leading role in building and providing technical carbon capacity in Africa. Other groups with an interest beyond individual projects, such as the Cocoa Carbon Initiative, are also beginning to enter this space.

SLM TECHNICAL SERVICE AND ADVICE PROVIDERS

In addition to the technical carbon components of project development and implementation, managers may need support specifically on SLM practices. Fortunately, Africa already has a number of strong institutions which are able to play this role, although more support is certainly needed.

For the Acacia rehabilitation projects in Senegal and Niger, the agricultural research centers – the International Crops Research Institute in the Semi-arid Tropics (ICRISAT) and the World Agroforestry Centre (ICRAF) – have been developing the Acacia planting techniques being implemented and are leading providers of technical support for the project. Development and Conservation NGOs operating in Africa also have deep expertise in SLM project and implementation. In areas with strong public agricultural extension services, government can also play a key role.

Many of these agricultural GHG projects identified in the inventory are in their early stages, but they provide enough information for a sense of how these projects operate and what kinds of organizations currently have the capacity to play various institutional roles. Studying these projects also provides insights into the major challenges for agricultural GHG projects in Africa. Based on the lessons from this inventory and other experiences working on agricultural GHG projects in Africa, the next section synthesizes insights on key institutional needs for success.

REQUIREMENTS FOR SMALLHOLDER SUCCESS IN CARBON DEALS

This analysis is oriented to the needs of small farmers in agricultural GHG projects. Of course, these projects need to be functional for all parties if they are to succeed for any of them, but there are certain challenges posed by these projects that are particular to farmers. These are barriers that, if overcome, can make the difference between significant livelihood benefits and exploitation. These needs include low transaction costs, risk management for farmers, secure land tenure and carbon rights, sufficient incentives for farmers to participate, access to financing for farmers and project developers, project management and implementation capacity, and sufficient demand for agricultural credits.

A description of each of these challenges is presented here along with examples of success in overcoming them and recommendations for interventions.

LOW TRANSACTIONS COSTS

Agricultural carbon supply chains are long, complex, and require expensive MRV systems. As in agricultural products supply chains where there is often very little money left over for the commodity farmers – who are among the first to be squeezed when sales prices drop – carbon farmers also face low margins. This problem is exacerbated for farmers in carbon projects because weak institutions and lack of competition increase overall transactions costs. Furthermore, carbon prices are currently low and individual farmers produce relatively small volumes of offsets.

This inventory was not designed to quantify the transaction costs of the projects, but the Partnership for Tropical Forest Margins (ASB) has estimated that in CDM afforestation/reforestation projects in Africa transactions costs can total as much as $200,000 and that 30-60% of the financial value involved in these projects is spent on transaction costs, even in situations with much less stringent requirements than the CDM.[25] One could assume that transaction costs in agriculture projects are as much, if not more, than those in the forest sector. It should be noted that it is very difficult to measure the total costs of project development. The start-up costs, including baseline measurements and community engagement, up to the point where credits are being generated, are often covered, in part, by outside donors. Even TIST, which is ostensibly a private carbon developer, has received substantial support in Africa from USAID. Agricultural landscapes in Africa are often agro-ecologically and socially heterogeneous, and, therefore, credit aggregation is a key challenge. Scale and simplicity, however, can be keys to achieving cheap aggregation.

The early African agricultural projects for voluntary buyers have tended to be charismatic but small. To achieve significant impact on communities and climate, however, will require the involvement of hundreds of villages or communities, which requires additional coordination, monitoring, and strong on-

[25] van Noordwijk, M., F Chandler and T Tomich. 2004. Introduction to the Conceptual Basis of RUPES. RUPES Working Paper No. 2004_2.

the-ground capacity. For these large-scale, complex projects to succeed they need to include local stakeholders in the design and implementation of the project, rely on strong aggregators and intermediaries, and ensure that the project generates direct benefits for local communities so that these communities have a real incentive to implement and maintain the project over the long term. While this large scale of operation could entail significant complexity in transaction structures and monitoring actions, there are opportunities to work with existing institutional structures to reduce transactions costs.

The Conservation Agriculture with the *Faidherbia albida* Intercropping project in Zambia is a promising case of an agricultural GHG project utilizing pre-existing organizational structures to reduce transaction costs. The project is being managed by Community markets for Conservation (COMACO), a community-owned and run organization with a market-based approach to rural livelihoods, food security, and biodiversity conservation in the Luangwa Valley of Zambia. COMACO works with 50,000 farmers and has established the infrastructure and network of extension services along with payment mechanisms necessary to bring markets to remote rural communities, and value-added agricultural commodities into regional centers. Based on initial estimates, the carbon project is anticipated to have the potential to generate over 148,000 Voluntary Emission Reductions per year at maturity. The decentralized nature of this project and its large number of project participants has made it possible to layer all carbon project activities onto existing infrastructure and systems that are already in place.

Another way that agricultural projects could reduce transactions costs in the future is to employ the programmatic approach to CDM, which allows bundling of small projects using the same methodology into one large project. This is not currently possible for agricultural projects under the CDM, but is being discussed in policy circles.

An allure of the programmatic approach is that it would reduce MRV expenses. As previously discussed, land-use methodologies within the CDM are rare and complicated to implement. Agricultural methodologies are now available within the voluntary markets, primarily under VCS and Plan Vivo, but are still very complex. However, monitoring and measuring technologies for agriculture GHG are improving rapidly with developments in remote sensing, sampling techniques for field measurements, and modeling tools. Remote sensing has been used to record land use and land cover change for several decades and can also be efficiently used to track changes in the relative distribution of land use classes over time. It can be used with sampling techniques as inputs into conversion equations and models. The accuracy of these indirect tools varies, depending on available data and local ecology. Typical inputs for models include information related to carbon stock estimates and activity data such as current and historic natural disturbance, management, land use change, climate, soil properties, growth rates, decomposition rates, biomass pools (above and below ground estimates), and estimates of variability and error. Despite these improvements, however, in Africa, reliable input data for models remains a major obstacle. Additional investment in these measurement techniques, along with promising innovations in participatory data collection – including the use of handheld GPS devices and cell phones, should significantly reduce costs over time.[26]

RISK MANAGEMENT FOR FARMERS

Small farmers have a limited asset base to absorb carbon project risk, periods of lower returns or higher labor requirements. When farmers are asked to make commitments to avoid land or forest clearing for long periods of time, their opportunities for new economic activities will likely be reduced, and these opportunity costs may grow over time as productive land becomes scarcer with population growth or development. Poor selection of tree species, spacing or management in agroforestry systems may

[26] Shames, S. (ed.) December 2009 (draft). Advances in Agricultural GHG Measurement and Monitoring: Implications for Policy Makers. Ecoagriculture Policy Focus, Issue 4.

suppress, rather than increase, yields of associated crops. Projects must identify ways in which project risk can be primarily absorbed by outside actors. The principle way that this can happen is to ensure that any climate-friendly agricultural or SLM intervention implemented by a farmer will improve his or her livelihood over time regardless of whether or not he or she receives a carbon payment. This is certainly possible with various agroforestry and conservation tillage techniques that have been documented to significantly increase yields over time. (See discussion of climate-friendly practices with co-benefits in Section 1.)

Another key strategy to reduce risk for farmers is to involve them in decision-making processes regarding where project sites should be placed. Farmers will have critical knowledge of which places within an agroecosystem may have the greatest benefits for land-based livelihoods. For example, acacia projects in Senegal and Niger are designed to regenerate land for communities so that they might be available for productive activities, even if on a relatively limited basis, in the future.

The contracting and negotiation processes should also be pro-farmer. Symmetry in negotiations is a key challenge as carbon deals are often driven by experienced buyers with the support of highly specialized legal and technical advisors driving hard bargains to buy credits as cheaply as possible for as long as they can, and developers – in the form of an NGO or company partner – may have limited experience in carbon markets and insufficient capacity or incentive to represent farmers' interests effectively. As a result of this imbalance, most carbon finance deals – particularly first time deals with new project developers – result in disadvantageous contractual conditions for the farmer. Farmers may not fully understand commitments under the contracts developed, or may be pressured to undertake activities on the farm that make little economic sense in the whole-farm context. Yet, it is essential to ensure secure benefits for farmers as only this approach will increase community commitment to support these projects, which will in turn increase the likelihood of their success. Greater symmetry in information and access to expert advice and support is essential if agricultural carbon finance is to actually generate meaningful benefits for farmers and returns for investors and buyers. This is important as the contract is negotiated but also as it is enforced and any disputes require mediation throughout the course of the contract.

Communities also need ample opportunity to have meaningful input into the design of a carbon deal and some level of oversight over its implementation. They should be able to devise their own least-cost solutions to deliver ecosystem services, and enhance sustainability. When possible, these planning processes can build on prior local self-assessment of ecosystem service needs and issues, so that communities understand their own priorities, opportunities, and limitations before initiating negotiations with buyers.

Ideally, communities engaging in these contracts should begin the process with pre-existing and robust farming and/or community organization(s) that support social cohesion, have broad member input, and are recognized within the community as a forum for legitimate decision-making. Before communities enter into contracts, these organizations should evaluate their objectives for their local economy and agroecosystem and consider how a carbon project can help achieve them.

Risk can also be mitigated if contracts include some element of flexibility so that the project can adapt to changing circumstances in local economics and climate and can incorporate lessons from local and relevant outside experiences. These agreements should be revisited periodically and given the room to improve.

LAND TENURE AND CARBON RIGHTS

In areas where smallholder land tenure is not secure, there is a risk that more powerful interests will claim land that becomes more valuable as a result of the financial potential generated by the carbon markets. Once communities restore degraded lands, largeholders or government agencies may come to claim them. In this way, the rights to carbon are closely associated to those for land. Unless rights for both are secured before a carbon deal is made by farmers, it will be very risky for farmers to move forward.

INCENTIVES FOR FARMERS: DIRECT PAYMENT TO FARMERS VS. PRODUCTION AND LIVELIHOOD BENEFITS

There is considerable disagreement among people with experience working with farmers, as to whether projects should pay individual farmers directly, pay farmer or community organizations, or consider non-financial project benefits to be sufficient. Given high transactions costs, in most cases the amount of money received by an individual farmer is insufficient on its own to provide an incentive to continue a particular land-use practice if it is not producing some other livelihood benefit. The level of potential carbon revenue should be clearly communicated at the farm level to avoid false expectations. For farmers, a carbon payment could be a catalyst for the adoption and maintenance of improved agricultural practices and technologies, but, in any case, it is the co-benefits of improved crop yields and improved livelihood-supporting ecosystem services that provide the bulk of the incentive.

If farmers do receive payments, there is a variety of ways that they can be distributed, including arrangements with local banks, electronic cards, cell phones or supplements to commodity payments. For example, a project in Kenya utilizes text messaging to allow farmers to claim cash from the carbon offsets they produce by using efficient cooking methods, such as a modern charcoal stove or solar cooker, instead of an inefficient open-pit fire burning biomass. TIST gives out vouchers to farmers based on the number of trees they plant that can be reimbursed at local banks.

Another approach to distributing agricultural GHG credits, given the relatively small amount of cash per farmer involved, is to use the payments to support the infrastructure to maintain and expand carbon-rich land use systems. Carbon payments could support a revolving fund to pay for technical carbon expertise or for agricultural and forestry extension activities, which offer farmers improved livelihoods. In Malawi's Trees of Hope project, the finance derived from the sale of carbon credits will help to provide farmers with training and extension services, seedlings, and financial incentives to plant and maintain trees.

An ideal might be a hybrid model in which a portion of the carbon proceeds go directly to farmers, some is utilized by community groups for collective initiatives, and the rest to a larger agroecosystem-wide conservation effort. A scheme along these lines is run in Madagascar's Makira Forest project, which distributes 50% of the carbon revenue to communities, 25% toward management of the protected area and 25% towards monitoring and marketing of the carbon project. The appropriate balance of distribution among stakeholders will be context specific it may differ for every project.

SECURING ACCESS TO PRE-FINANCING AND FINANCIAL INTERMEDIATION FOR FARMERS AND PROJECTS

A large share of the cost of producing agricultural offsets comes in a project's planning and establishment phase. Projects may take a number of years before they begin sequestering carbon and generating carbon credits. The interventions will need to be financed before these payments begin to flow. The cash flow of payments on the VCS, for instance, is "on issuance only," which means that payments increase as time goes on for agricultural projects. Therefore, it will be essential to raise upfront finance. Unfortunately for farmers, upfront finance linked to carbon credits is typically provided by buyers interested in getting a hefty discount on credits. Mechanisms are needed by which finance is available for project design and development of carbon baselines and technical assistance at reasonable terms.

Ideally, projects would find a buyer for the future stream of credits at a sufficient price to develop the project. This has proven to be difficult in the current market. However, some projects are finding funds. In addition to some buyers hungry for risk, projects have found support from impact investors; philanthropic or government institutions; field program management organizations interested primarily in the project's co-benefits; independent micro-finance institutions willing to operate on a multi-year basis; and in some cases, farmers' self-financing.

For Africa, the World Bank BioCarbon Fund has often played a catalytic role in raising these funds. For the Ibi Bateke Carbon Sink Plantation project in the DRC, the BioCarbon Fund has played a pivotal role in enabling NOVACEL, the local NGO which acts as the field program manager, to obtain loans from private firms (Suez and Umicore) to finance upfront investments. It has also attracted the participation of other carbon buyers – Orbeo, a subsidiary of the French conglomerate Société Generale, and Rhodia.

With such an acute need for pre-finance, sellers, buyers, and certifiers must also be careful not to overreach. The Sofala project in Mozambique certified by Plan Vivo allows for the issuance and sale of 100 years of credits within the first seven years of the project. This policy is based on the assumption that the adopted project activities become self-financing after seven years through the livelihood co-benefits they provide. This practice, however, has called into question the rigor of the Plan Vivo methodology and has devalued its credits in some circles.[27]

IMPLEMENTATION/MANAGEMENT CAPACITY

Even when the previously discussed institutional elements are in place, project actors still need the capacity to implement these programs. Many of the project developers, field program managers, and community organizations identified in the inventory are encountering carbon projects for the first time. Most smallholders and communities have worked through NGO, private sector intermediaries, or government outreach staff, not directly with buyers. These projects have been of highly variable management quality and there is still limited capacity in African institutions – NGOs, government agencies, private sector and research institutions – to support the technical elements of carbon projects. The outside expertise that has been employed so far is very expensive, and unless local capacity improves, agricultural GHG projects will not thrive in Africa.

Community groups, in particular, need to play a more proactive role in project development and implementation. A key element of their participation will be additional expertise in project design. The World Bank BioCarbon Fund and the CCI are both examples of groups in this space working to build carbon project capacity among small farmers in Africa. The BioCarbon Fund holds trainings for project developers on monitoring methodologies for carbon projects aimed at project developers. One such training was organized for Francophone Africa at the Ibi Bateke station in the DRC in November 2009. The CCI, funded by a consortium of private foundations and chocolate companies, and implemented by NGOs, has organized trainings in Ghana on project development.

DEMAND FOR CREDITS

The buyer market for agricultural carbon is currently quite small due the complexities of the rules for these projects discussed in the first section. But buyers can still be found. This group is led by impact investors such as the World Bank BioCarbon Fund, but other buyers and investors are exploring ways to utilize the new VCS methodologies and are closely tracking potential changes in CDM rules and the possibility of a cap-and-trade system within the United States that would include agricultural offsets.

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27 See Case Study – Sofala Community Carbon Project, Mozambique

Agribusinesses with African supply chains are also exploring the potential of engaging with African carbon projects. They can engage as developers, managers, sellers, and buyers of credits. These companies can work directly through the medium of carbon credits or they may also link the mitigation values to their agricultural products and sell them jointly as eco-certified products. The Rainforest Alliance is a leading eco-certifier working on methodologies to make this easier.

The key message from the discussion of challenges in this section is that these projects will need a spurt of institutional support to get them off the ground, but will also need to develop the capacity to maintain and grow these initiatives for the long-term. Many sustainable land management programs and projects in Africa have relatively short time-horizons, although there are some notable exceptions of long-term investments. For agricultural GHG projects to succeed, it will be essential to identify and establish partnerships with these long-term investments and Africa's strongest institutions to ensure that full carbon offset benefits are produced, monitored, and delivered to buyers, and that they support the livelihood development of the sellers and the health of their agroecosystems. The following section discusses the roles that various sectors can play in the long-term prospects of agricultural carbon projects in Africa that support sustainable agricultural development.

ADVANCING CARBON MITIGATION IN AGRICULTURE: ROLES FOR VARIOUS SECTORS

For agricultural GHG mitigation projects to play a major role in African rural developments and conservation, all sectors will need to play their appropriate role. These groups includes national governments, community organizations, local and national NGOs, research institutions, international donors, and the private sector.

NATIONAL GOVERNMENTS

The work of supporting agricultural carbon projects starts with national governments. They will need to establish national policy frameworks for investment, financing and development of agricultural GHG projects. Ministries of environment, agriculture and others will have to coordinate their efforts so that policy in this area can be designed and enforced in a coherent and reliable way. They could also identify priority strategies locally where carbon finance can contribute to pre-existing landscape initiatives and support livelihood and ecosystem co-benefits. Government agricultural extension services should be supported and utilized to link with carbon projects.

African governments might also expand their role in the international negotiations that govern carbon markets within the UNFCCC. This would consist of a louder and clearer voice on CDM reform to include agriculture and other AFOLU projects, and advocacy for the inclusion of land use Nationally Appropriate Mitigation Action (NAMAs), which are still only vaguely defined within the UNFCCC negotiations.

FARMERS AND COMMUNITY ORGANIZATIONS

Farmer and community groups should continue to explore low-cost models for selling their agricultural carbon credits. There is also scope for them to expand their role in practically all areas of the carbon supply chain, including project identification, management, and technical capacity support to members. Farmers should also organize to play a more substantial role in the international and national rule setting around climate change, generally, and agricultural GHG projects in particular.

LOCAL AND NATIONAL CONSERVATION AND DEVELOPMENT NGOS

Like farmer and community organizations, these groups have enormous potential to contribute throughout the agricultural carbon supply chain. So far, they have primarily played the role of field program managers, but they can build beyond this. Over time, as they become more familiar with how these markets work, they can take the lead in identifying and developing potential projects. They can also build internal technical capacity to serve as extension agents for SLM practices as well as experts on MRV.

INTERNATIONAL NGOS

International NGOs can play a key role in advancing agricultural GHG markets by innovating ways to leverage their pre-existing activities in sustainable agriculture and conservation to link to carbon markets. These groups are well-placed, with the necessary relationships and expertise, to develop large-scale projects and provide technical SLM support in areas where government extension services are weak. Where carbon project support services are expensive or inaccessible, they can also build capacity so that they can provide "full service" agricultural project support. This role will serve the interests of small farmers as these groups' primary objective is usually to support them along with the ecosystem services critical to their livelihoods.

RESEARCH INSTITUTIONS

For agricultural carbon markets to function over the long term there must be trust in the quality of the credits. Research institutions, and to some extent private carbon measurement firms, will need to provide accurate and cheap measurement tools for climate mitigation as well as the related livelihood and ecosystem for benefits in which many buyers will be interested. These methodologies should be available to function on a large scale and be able to measure all carbon sinks and emissions reductions throughout an agricultural landscape. In addition to carbon MRV, researchers should continue to develop the climate-friendly sustainable land management technologies on which these agricultural carbon projects will be based.

PRIVATE SECTOR

The private sector, as the group with the potential to capture most of the financial gains, has a heavy responsibility in the development of these markets. Carbon project investors and credit buyers will need to recognize that these markets are still emerging and that they should support a "learning by doing" approach even if it is uncomfortably risky at times. The private sector carbon professionals will have to innovate models for pre-financing, such as microfinance, to get projects started and to mitigate risk for farmers. The international carbon professional roles will continue to be essential; however, ideally more of this capacity will reside in African institutions over time.

The other critical private sector group is the agribusiness and food industry, which has the potential to drastically reduce transactions costs by implementing these projects within their existing supply chains and corporate infrastructure. Their experience is beginning to build, and will only grow with increasing pressure from consumers – and possibly regulation in the future – to provide products with a lower climate impact.

INTERNATIONAL DONORS

There has been an increase in the level of support for sustainable agricultural land management activities in sub-Saharan Africa in recent years, and although most of these investments were not originally designed for carbon mitigation projects, donors are now considering ways to link carbon finance to SLM objectives. As markets develop, most elements of the agricultural carbon supply chain will need support in some form or another.

At this moment, a particularly critical need is support for capacity-building among farmer and community organizations to participate in these projects. Investments might include trainings for farmer and community organizations on project development and management, and the development of low-cost, pro-farmer MRV methods.

Donors could also collaborate with sellers and buyers to improve opportunities for upfront finance for projects. As discussed in the previous section, private buyers require a deep discount from sellers in order to buy these early agricultural credits. For sellers, the need for upfront finance erodes much of their profit margin. Donors could support an institution that can bridge this gap as a buyer of future streams of agricultural credits at a fair price for sellers. A revolving fund could be established in which the pre-credits could be sold to fund the development of future projects.

USAID

The recommendations for international donors also apply to USAID. However, USAID is in a unique position as it is simultaneously considering its climate investments and implementation of the Feed the Future strategy. Investments in pro-farmer infrastructure for agricultural GHG projects have the potential to meet the objectives of both of these strategies. By supporting agricultural production systems, and associated technical assistance programs, that increase carbon sequestration, USAID can lay the foundation for future large-scale sequestration payments.

Another critical role for the U.S. Government is leadership on international climate policy. Although USAID may not be the lead agency for the U.S. Government in these discussions, it might communicate the ways in which agricultural carbon finance has the potential to support multiple agendas. This paper has focused primarily on the anatomy and development of carbon projects, but there is a broader discussion to be had regarding specific policy initiatives that could support the flow of carbon finance – in the form of mitigation and adaptation funds – to smallholders in Africa.

ANNEX 1 SOFALA COMMUNITY CARBON PROJECT CASE STUDY

CARBON CREDITS FROM SUSTAINABLE LAND USE AND RURAL DEVELOPMENT

PROVIDED BY THE SOFALA COMMUNITY CARBON PROJECT
IN MOZAMBIQUE

PREPARED BY: JOHN FAY

MARCH 2010

BACKGROUND

The Sofala Community Carbon Project is the continuation and scaling up of the Nhambita Pilot Project. Initiated as a research trial phase in 2002 with a group of 53 farmers, this project serves as one of the pioneering agriculture land management projects in Africa and globally. The project was funded by the European Union (additional support provided by Envirotrade, University of Edinburgh, and DFID) to assess the potential of rural development land use practices to generate verifiable carbon emission reductions. The project ran until August 2008 and is a flagship Plan Vivo project. It has operated under the voluntary standard since the research trial started in 2002.

Since September 2009, the Sofala Community Carbon Project continues the work of the Nhambita pilot to facilitate sustainable land use and rural development activities in communities within the Gorongosa National Park buffer zone in Sofala State, central Mozambique. The project financing now depends on carbon sales to guarantee its maintenance, payment to cover operations, and compensation to project participants is dependent on the sale of project generated VERs (verified emission reductions). The objective is to move from a joint donor/investment phase to become dependent on sales of carbon offsets. Projected CO2e offsets from the project exceed one million tonnes and is expected to provide income for the project to continue its activities. Local knowledge transfer has also increased the communities' capacity for overseeing all aspects of the project. The expansion of the project into adjoining areas will be determined by the availability of markets and the sale of the VER offsets.

APPROACH

The projects work with a large number of rural smallholders to promote the adoption of sustainable land use management and generate VERs. The individual smallholders can choose to adopt mitigation activities from a selection of different land use systems (seven agroforestry and one forestry system – See Annex A). For each of these systems, technical specifications summarize all relevant information (i.e. establishment, management, site requirements, carbon sequestration potential, etc.). For each system that a producer decides to adopt, a contract is established with Envirotrade – the project developer. Guidance is then provided to the rural farmer on how to adopt the system that must then be monitored and verified as the basis for carbon payments.

As of August 2009, the agroforestry systems have been widely adopted. Each farmer may have several contracts (currently there are some farmers who already have six systems in place), the total crediting period per farmer can be layered using multiple systems with a new one each year. This means that actual carbon revenues are paid out over an extended period – for example, a farmer with four systems implemented over four years will get payments for 11 years. There are 1,023 producers in Chicare community who have signed 2,858 contracts with the project developer. For each adopted system, an individual contract is signed; thus, one producer might have more than one contract. In Matenga (Mucombeze) community there were 496 producers who have signed about 1180 contracts. In the Zambezi Delta there are producers who have signed 410 contracts. In total, 1,755 producers have signed 4,448 contracts. In addition, the forestry system was adopted on 9,405 ha in Chicare community and 366 ha in Matenga community. The total area amounts to 9,771 ha.

From 2002-2009, the project has produced a total of 476,210 tCO2e VER to be sold ex ante. Of these, a total of 168,740 tCO2e have already been sold. The balance of 307,469 tCO2e, which are held on stock by the project developer, and all new VERs generated after the baseline was established in January 2007, are subject to the Climate, Community and Biodiversity Alliance (CCBA) validation by auditor/certifier Rainforest Alliance. In 2009, Envirotrade submitted a project design document to the project design CCBS to further prove the projects' additional community and biodiversity benefits and increase salability of the corresponding VERs.

Agroforestry is calculated as an average carbon benefit per hectare modeled over 100 years. Individual projects are limited to selling a tenth of the total carbon benefits from the forestry systems per year under Plan Vivo. Total VERs produced for sale are 476,210 tCO2, 355,352 from agroforestry (total benefits calculated ex ante), and 120,857 tCO2 from forestry. A further 686,823 from forestry will be available for sale in the future.

The marketability of Plan Vivo credits has the potential to negatively affect future revenue streams. Plan Vivo is often regarded as not rigorous for potential buyers and other standards, including the VCS, have competing, more stringent agriculture land management methodologies in development. One commonly noted problem with the approach taken by Sofala is the crediting period.

For agroforestry-related mitigation measures, the crediting period is 100 years; however, farmers who have signed contracts adopting these systems are paid during the first seven project years for the entire offset stream of 100 years. This is based on the assumption that the adopted project activities after seven years are self-financing and provide sufficient incentives to continue with the adopted management activities. As a result, long-term viability and permanence of the Plan Vivo VERs can be questioned.

IMPLEMENTING ORGANIZATIONS[1]

The project is implemented by *Associação Envirotrade Carbon Livelihoods*, a Mozambique not-for-profit Association. The organization is in charge of managing the project's day-to-day operations, running the technical operations, employing local staff, and managing relations with the local communities involved. All operational costs relating to project delivery by Associação Envirotrade Carbon Livelihoods are to be covered by one-third share of any carbon offset sale, provided after the sale of the VERs. Any unused funds are contributed to Mozambique Carbon Livelihoods Trust (MCLT) for benefit of the community.

Envirotrade Group, based in Mauritius, has the responsibility to market the carbon offsets generated by the projects, negotiate the sale of the carbon offsets, raise additional finance where necessary, pay taxes on carbon offset sales, carry out research and administer and develop new projects. In return, Envirotrade Group receives up to one-third of the proceeds of any carbon offset sales.

Mozambique Carbon Livelihoods Trust is a Mozambique trust fund established to manage the proceeds of the carbon sales. This vehicle protects the interests of the farmers and the local communities. Its board members include independent NGOs, the Community Association, Contabil (an auditing firm), and Associação Envirotrade Carbon Livelihoods.

The Mozambique Carbon Livelihoods Trust was launched in 2007 to ensure the community and individual farmer proceeds from the carbon offset sales were safeguarded. Approximately one-third of the proceeds of any carbon offset sale is allocated directly to this fund and is paid out to individual farmers over seven years. A portion of the income will go to farmers directly, and another portion will be distributed according to the needs of the community as a whole at the discretion of the trust in consultation with the local community. Of the portion distributed to the farmer, the schedule of payments is as follows: 30% of payment immediately after planting, followed by 12% per year for five years, then a final payment of 10% in the seventh year.

[1] All information provide on implementing organizations and carbon revenue allocations is sourced in publicly available documents written by Envirotrade.

MENU OF AGROFORESTRY INTERVENTIONS

The agroforestry systems options within the program and monitoring targets as defined per the August 2009 CCBS PDD provided by Envirotrade.

Boundary planting: Monitoring targets for the first four years are based on establishment; the whole plot must be established by the third year with at least 85% survival rate of seedlings. Thereafter, monitoring targets are based on DBH. The expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Dispersed Interplanting Gliricidia: Monitoring targets for the first four years are based on establishment. The whole plot must be established by the third year with at least 85% survival of seedlings. Thereafter, monitoring targets are based on DBH. The expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Dispersed Interplanting Faidherbia: Monitoring targets for the first years are based on establishment. The whole plot must be established in the third year with a survival rate of at least 85%. Thereafter, monitoring targets are based on DBH. The expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Fruit Orchard Cashew: Monitoring targets for the first four years are based on establishment. The whole plot must be established by the third year with at least 85% survival of seedlings. The targets are based on DBH, with the expected DBH at the time of monitoring based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Fruit Orchard Mango: Monitoring targets for the first four years are based on establishment; the whole plot must be established by the third year with at least 85% survival of seedlings. Thereafter, monitoring targets are based on DBH: the expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Homestead Planting: Monitoring targets for the first four years are based on establishment; the whole plot must be established by the third year with at least 85% survival of seedlings. Thereafter, monitoring targets are based on DBH: the expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

Woodlot: Monitoring targets for the first four years are based on establishment; the whole plot must be established by the third year with at least 85% survival of seedlings. Thereafter, monitoring targets are based on DBH: the expected DBH at the time of monitoring is based on a predicted mean annual diameter increment on which carbon sequestration estimates are based.

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ANNEX 2: COMACO CASE STUDY

CARBON OFFSETS THROUGH CONSERVATION AGRICULTURE APPROACH OF INTERCROPPING "FAIDHERBIA ALBIDA" AT COMACO IN ZAMBIA

PREPARED BY: JOHN FAY

MARCH 2010

BACKGROUND

Food insecurity and poverty are persistent problems for many households in Zambia, and often lead rural households to rely heavily on their natural resources to survive. Forests are cleared to make way for new agricultural land, wildlife is hunted to provide additional protein or to be bartered for staples such as maize, and soils are gradually degraded by unsustainable farming practices and inadequate fallow periods as pressure on arable land increases. Zambia is not alone in being burdened by these issues, but they are proving to be particularly pernicious here, and could grow more widespread as rainfall becomes more variable and temperatures change due to increasing greenhouse gases (GHG) in the atmosphere.

Rural farmers, as the largest natural resource managers in the world, can have significant collective impact on GHG concentrations in the atmosphere. But these need not be a burden. One of the most fundamental means of carbon sequestration available – trees – can also improve smallholder farmers food security and enhance household incomes.

Known as agroforestry, intercropping with trees, such as *Faidherbia Albida* or *Msangu,* can significantly improve yields, and has the additional benefit of shifting land management strategies away from slash-and-burn agriculture, thus reducing emissions from agricultural practices that accelerate deforestation and degradation of forests. However, agroforestry is a long-term investment. Trees require additional labor inputs for their establishment and maintenance, and it can take several years to see the benefits of increased crop yields. This delayed return on investment has been a major challenge in promoting the adoption of agroforestry in Zambia. Carbon markets have the potential to incentivize such adoption by smallholder farmers, helping them to benefit from increased food security and resilience to climate change.

The voluntary carbon markets provide a mechanism through which GHG emission sequestration can be a valuable asset, one that farmers can create with the resources already available to them – land, labor, and seeds. Farmers can then realize the financial value of these carbon assets through carbon markets, providing returns to cover their initial investment.

APPROACH: CONSERVATION AGRICULTURE WITH FAIDHERBIA ALBIDA INTERCROPPING

The *Faidherbia Albida*[1] *(FA)* tree is unusual in that it displays reverse phenology. The tree leafs up in the dry season and defoliates in the rains, thus reducing competition for sunlight with crops. At the recommended planting density of 100 *FA* trees/hectare, mature *FA* trees supply the equivalent of 300kg of complete fertiliser and 250kg of lime, which result in an estimated 250-400% yield increase in maize under the tree canopy (Conservation Farming Unit, Zambia). FA also improves soil fertility, protects against soil erosion and reduces the need to clear forest for new cropland. This can create a legitimate financial asset that can be monitored, verified and registered.

No known reliable data exists for the carbon dynamics of *FA*. In response to this information gap, a study led by Sam Bell of Cornell University has been commissioned with financial support and technical assistance provided by the Cornell Center for Sustainable Futures and the USAID PROFIT project. The study will also estimate the impact of *FA* on soil carbon. This will require soil sampling and analysis from the project area in question, along with modeling of soil dynamics (using RothC, Century or similar). To further verify the impact of *FA* on soil carbon, the total carbon of cropland soils under standing mature *FA* will be compared with the total carbon of cropland soils without the influence of *FA*. Although other emissions sources and gases will need to be monitored, assessed and included, the carbon sequestered in soils and trees will form the two main components of the emission offsets.

[1] The FA tree is known by many different names including Acacia Albida, Winter Thorn and Msangu.

Initial assessments (subject to final confirmation), based on a predicted VER price range of USD$3-11, estimate the carbon asset per hectare per year of USD$22.20 – USD $81.40.

IMPLEMENTING ORGANIZATION: COMMUNITY MARKETS FOR CONSERVATION (COMACO)

COMACO (www.itswild.org) is a community-owned and run organization with a market-based approach to rural livelihoods, food security, and biodiversity conservation in the Luangwa Valley of Zambia. COMACO has established the infrastructure, network of extension services, along with payment mechanisms necessary to bring markets to remote rural communities, and value-added agricultural commodities into regional centers.

As a result, COMACO is perfectly positioned to leverage their existing infrastructure to implement projects that offset GHG emissions throughout the entire Luangwa Valley ecosystem. COMACO can also ensure that those who create emission reductions – smallholder farmers – will receive the financial benefits from carbon finance. Opportunities with the potential to leverage the voluntary carbon markets include: agroforestry and conservation farming – growing the native tree Faidherbia albida (FA), and Gliricidia sepium (GS) in croplands to improve yields; and avoided deforestation by reducing threats such as slash-and-burn (chitemene), charcoal-making, and the creation of community parks (REDD).

Implementation of Agricultural Land Management (ALM) in the form of agroforestry is underway on the eastern side of the Luangwa River in the valley and on the plateau, where the soils are most conducive to growing FA trees. The project has completed the Project Idea Note (PIN) for the Voluntary Carbon Standard (VCS). Currently there are no Agricultural Land Management Methodologies approved on any rigorous voluntary standards,. With support from the World Bank's BioCarbon Fund, the Sustainable Agriculture Land Management (SALM) methodology is at the first validation of the dual validation approval process. COMACO intends to leverage the pending SALM methodology upon its approval, therefore COMACO has already commenced work on the Project Design Document (PDD). There are currently over 27,000 farmers working with COMACO on the Eastern part of the Luangwa Valley who represent the participants in the initial phases of this agroforestry initiative. Each farmer is planting on average one lima of land with FA trees. Another 24,000 farmers will be added to the program by the end of 2011 for a total of 51,000 farmers, each planting an average of 38 FA trees. Based on initial estimates, the project is anticipated to have the potential to generate over 148,000 Voluntary Emission Reductions per year at maturity.

The decentralized nature of this project and its large number of project participants has made it possible to layer all carbon project activities onto existing infrastructure and systems that are already in place. Additionally, the finance each farmer will gain from the carbon credits is intended to help adaption and implementation of the project, the real benefit lies in the longer term substantial increase in yields provided by FA trees – thus making this carbon project a means to an end of better food and income security.

ANNEX 3: THE COCOA CARBON INITIATIVE

PREPARED BY: MATTEO BIGNONI

MARCH 2010

BACKGROUND

Ghana is experiencing one of the highest deforestation rates in Africa at nearly 2% per year and it has lost 85% of its original forest cover in the last 100 years. The World Bank estimates that the main cause of deforestation in Ghana is agricultural activities, which account for six times more loss of forest cover that logging. In particular, cocoa farming represents the main deforestation factor.

Indeed, Ghana is the second world's largest cocoa producer – after Cote D'Ivore and before Brazil, with an annual yield in 2007 of 680,000 tonnes. Cocoa is a key driver of the Ghanaian economy and it accounts for 40 % of the total exports of the country and, more that 30% of local farmers depend on cocoa plantations for their livelihoods. Nevertheless, cocoa production in Ghana has considerably increased in recent years, mainly due to the consistent expansion of the total land devoted to cocoa production rather than to an actual increase in farm productivity.

Farming techniques vary quite considerably within the country so that, for example, in the Western Region of Ghana nearly 80% of cocoa planting is conducted with no shade or low-shade cover and less than 20% of canopy cover, while in the Eastern Region half of the cocoa planting is carried out with a high-shade method, that is with a 30-40% canopy cover.

Over the last few decades, the conversion of Ghana's forests into cocoa plantations has rapidly increased, mainly because of two factors – namely, the introduction of chainsaws and of genetically-modified cocoa varieties that are more tolerant to sunlight. Those improved varieties have allowed the adoption of low or no-shade cocoa farming techniques at the expense of more traditional and more sustainable cocoa landscapes.

Moreover, the continuous expansion of new cocoa farms into forests has also been supported by the high fertility of forest soils, also known as forest rent, and by the farmers' choice not to use fertilizers in already cultivated areas. At the same time, the degradation of soil in relatively old farms is producing very low yields, which, in turn, has instigated a perverted cycle. Indeed, low yields caused by ecosystem degradation promote further expansion into new forest land and the establishment of large farms in order to obtain a sufficient harvest while older farms are abandoned.

Furthermore, a recent study from the University of Reading has shown that there exists a trade-off between short-term cocoa trees productivity and the well-being of the ecosystem they depend upon. The study has demonstrated that soil fertility will decrease very rapidly in those farms characterized by short-term high yields achieved through minimal shade or no shade techniques. Low soil fertility will cause not only a very rapid degradation of the ecosystem, but also unsuitability for further cocoa farming or other agricultural activities. In addition, while at the national level the constant degradation of forest cover could be detrimental for Ghana's cocoa economy; at the international level, it is one of the main causes of climate change, being responsible for 20% of global CO_2 emissions.

THE COCOA CARBON INITIATIVE (CCI)

In this context, the Cocoa Carbon Initiative has been established by the Katoomba Incubator and the Nature Conservation Resource Centre (NCRC) as an effort to provide Ghanian cocoa farmers with the opportunity to benefit from carbon finance though Reducing Emissions from Deforestation and Forest Degradation (REDD or REDD+). In short, cocoa farmers could collectively decide to stop the expansion of farms into unprotected forest land and to halt the agricultural encroachment into Forest Reserves (FRs), so as to be eligible for REDD. Alternatively, farmers could decide to maintain a high level of in-farm carbon stock and to enhance carbon sequestration though the intensification of shade tree (canopy) at a level that is higher than business per usual, that is a REDD+ activity.

These improved farm management systems could provide economic and ecological benefit not only to the cocoa sector, but also to the larger landscape. The CCI is seeking to implement two pilot projects over the 2009-2011 periods in order to test the viability and long-term sustainability of REDD/REDD+ scheme in cocoa sector in Ghana. For this purpose, the incubator has developed a feasibility study based on stakeholder consultations to identify the project areas. The consultations involved three key activities:

Potential Site Selection Workshop (November 24, 2010)

The threats posed by climate change to the cocoa sector as well as the potential for finance through REDD were explained to the workshop participants. Also, the workshop discussion was centered on the development of assessment criteria for site selection and the identification of 15 potential sites.

Site Assessment Field Trips (January 18-24 and February 8-14, 2010)

The field trips were aimed at evaluating all the potential sites against the criteria identified during the previous workshop. The sites included the five cocoa growing regions and five sites were eventually selected: Amansie West, Assin North, Asunafo North/Asutifi, Juabeso, and Wassa Amenfi West.

Site Selection Workshop (February 26, 2010)

This second workshop included a final review of the Cocoa Carbon Initiative, an introduction to REDD+, and a further discussion of the site selection criteria. Participants discussed the outcome of the field trips and selected the strongest sites for the development of the two pilot projects based on which site possessed the strongest potential.

The final three selected sites are:

- Juabeso (Western Region)
- Asunafo North Municipal/ Asuti (Brona Ahafo Region)
- Assin North

The following table describes the three sites selected for the pilot projects:

Selected site	Ecosystem	Plantation	Carbon Financing option	Potential partners
Juabeso (Western Region)	Bia National Park and many high biodiversity value reserves threatened by logging and cocoa farm encroachment	Farms are normally large and with little to no shade. Also, many abandoned farms	Three options: REDD to reduce farm expansion into forest reserves; REDD to protect off-farm forests; REDD+ to increase on-farm shade trees	Sustainable Tree Crops Programme (STCP), Kuapa Kokoo, Coca Abrabopa, Wildlife Division
Assin North (Assin Fosu)	Kakum National Park and adjacent Dedicated Forest (DF), less than 150 ha.	Cocoa farming is the main land-use activity. Also, many abandoned farms.	REDD+ to increase shade intensity; REDD to protect off-farms reserves	CREMA approach

Asunafo North Municipality (Goaso) and Asutifi	Eight Forest Reserves with a high biodiversity value (rare birds) and many off-reserves forests and secondary forests threatened by cocoa farms expansion	Very little shade	Three options On-reserve REDD to reduce cocoa expansion into Forest Reserves; Off-reserve REDD to reduce deforestation caused by cocoa farms; REDD+ to enhance shade cover through natural regeneration and tree planting	Cocoa Abrabopa, Kuopa Kokoo, STCP, Cadbury Cocoa Partnership (CCP), Government institutions and possibly CREMA model

CHALLENGES FOR THE IMPLEMENTATION OF REDD/REDD+

Monitoring and verification

Cocoa plantations in Ghana are mainly owned by smallholders and, indeed, most farms are between 1 and 5 hectares. While carbon financing undoubtedly is storing a vast potential for poverty reduction, smallholder ownership of cocoa farms can raise critical challenges to a cost-effective monitoring and verification of carbon schemes.

First of all, monitoring methodologies will need to be modified to adapt to a plethora of small farms. Indeed, so far REDD methodologies deal with large and relatively homogeneous landscapes such as national parks. In contrast, because the CCI will cover an aggregation of small patches of land distributed across the national territory, monitoring and verification methodologies will have to deal with a variety of ecosystems and their diverse ability to store carbon.

Secondly, at the national level, investment will have to be provided for the use of appropriate satellite technology to assemble data relative to all of the small farms. Finally, the CCI will have to be supported by a coordinating organization to encompass all the different smallholders into a national programme that can reach the critical size to become attractive to carbon investors. In relation to this last point, the CCI intends to work closely with organized cocoa producers at the national level such as The Kuapa Kokoo and Cocoa Abrabopa. Those cooperatives could easily provide a very solid foundation for the envisioned aggregation system.

Similarly, the CCI is intends to establish so-called “Community Resource Management Areas (CREMA)” in the sites selected for REDD/REDD+. Indeed, CREMAs are legally recognized community-based organizations aimed at enforcing traditional laws on natural resource management. For instance, CREMAs can increase farmers control and involvement in the management of natural resources, typically wildlife, better tenure rights over trees or the power to regulate land tenure issues.

While CREMAs have so far been limited to wildlife, ecotourism, and biodiversity activities, the new Wildlife Bill currently examined by the Ghanaian Government could include new regulatory framework for the objectives of REDD/REDD+. Hence, the ICC would rely on the establishment of a network of CREMAs in order to interconnect the different sites and to offer an interface between the local communities and institutional actors.

Trees Tenure Rights

As in many other West African countries, tree tenure rights could represent one of the main constraints to the full implementation of REDD or REDD+ schemes. In Ghana, the State owns all naturally-growing trees while planted trees belong to the individual who actually planted them. At the same time, farmers are allowed to cut naturally-grown trees for agricultural or household purposes but they are also forbidden to sell timber for commercial use.

Since many cocoa farms are located in off-reserves that the Government leased out as timber concession zones, loggers are legally allowed to enter the farms and to fell naturally-occurring trees. In theory, the law in Ghana requires the loggers to compensate the farmers for any damage caused to the cocoa plantation but, unfortunately, this legislation is rarely enforced.

As a consequence, in order to avoid any possible damage to their plantation, farmers will select non-timber shade trees or eliminate all naturally-growing trees in their farms. Furthermore, another option that farmers might choose is to sell the timber from their plantation to chainsaw workers and share the revenue from the sale of the timber with them. Thus, the development of future REDD or REDD+ operations may be dependent on whether or not farmers may obtain more rights over trees as part of a potential tenure rights reform decided by the Government. Increased trees tenure rights will incentivise farmers to preserve their in-farm trees and, thus, to increase carbon stock.

Opportunity Cost of REDD/REDD+ mechanisms

The current market price of carbon is not sufficient to induce cocoa farmers to engage in large-scale in-farm tree intensification or to stop farms' encroachment into protected forest reserves. While one of the main future tasks of the CCI is to identify a clear break-even price for carbon that will allow REDD/REDD+ schemes to become attractive to both investors and farmers, business per usual cocoa farming is currently more profitable and less risky than farm management systems qualifying for carbon financing.

Indeed, high level of risk associated with REDD/REDD+, uncertainty about land and trees tenure rights, and the need to produce increasingly higher levels of yields per hectare are some of the factors that have justified the use of high interest rates (opportunity cost) employed in all financial models that have so far proposed carbon financing in cocoa farms in Ghana. Clearly, REDD/REDD+ would need to compensate farmers for all the relative losses and risks in a scenario of improved farm management systems.

However, if farmers could obtain the right to sell specifically selected timber deriving from their farms, one of the solutions envisioned by the ICC is to combine the revenue from timber with the revenue generated from REDD credits. This would certainly make the adoption of improved management systems more profitable and attractive.

CONCLUSIONS

In Ghana, the expansion of cocoa farms is the main driver of deforestation and land degradation. The Cocoa Carbon Initiative seeks to encourage improved farm management systems that could lead to the full implementation of REDD/REDD+ schemes. The CCI has started the development of two pilot projects in three selected sites in Ghana: Juabeso (Western Region), Asunafo North Municipal/ Asuti (Brona Ahafo Region), and Assin North.

The sites were selected through consultations with local communities and field trips specifically designed to assess the suitability of the three locations. More specifically, REDD activities will be focused on preserving protected forests from cocoa farms encroachment while REDD+ activities will be centered on enhancing carbon stock through improved farm management systems, typically the intensification of shade trees.

The CCI seems to possess a very sound approach to the implementation of valid REDD/REDD+ schemes. Its bottom-up methodology to the selection of appropriate sites for the pilot projects is a good indicator of the long-term sustainability of the projects, which admirably seeks to integrate the protection of extremely valuable forests with an effort to reduce poverty though the increase in agricultural yields in cocoa plantations as a function of improved farm management systems.

This study has however identified three main challenges to the full implementation of REDD/REDD+ mechanisms for cocoa farms in Ghana. First of all, this study described the difficulty to adapt current carbon monitoring and verification methodologies to a collection of small farms. Secondly, it explained how tree tenure rights might hinder the preservation of in-farm carbon stock and, finally, it discussed the high opportunity cost associated to the switching to more sustainable improved farm management systems.

All in all, the Cocoa Carbon Initiative could prove to be very successful and remunerative for farmers. Also, within the institutional context of West Africa, Ghana has so far been extremely proactive in providing a suitable regulatory environment for the development of conservation efforts such as REDD/REDD+. It is very possible and desirable that the Cocoa Carbon Initiative may provide a good example of project to replicate in other part of West Africa so as to challenge the status quo of institutional lethargy that permeates the region in relation to its enormous potential for agricultural and forestry carbon initiatives.

ANNEX 4: THE SHEA CARBON PROJECT

PREPARED BY: MATEO BIGNONI

MARCH 2010

BACKGROUND

Shea butter is a natural fat extracted from the seeds of African Shea trees. The butter is obtained by boiling or crushing the seeds and nowadays, it is very widely used in the production of cosmetics as a moisturizer and, because it also edible, as a substitute for cocoa butter in the food manufacturing industry.

Shea butter has become a relevant export product for West African countries and is playing a key role in the support of community-based economies, especially in countries such as Mali and Ghana. Indeed, Shea butter preparation still follows traditional methods, mostly conducted by locally organized cooperatives of women.

It is estimated that the value of the global Shea butter market for cosmetic products alone will approach $10 billion, with the United States and the European Union as the two largest importers. Remarkably, the global demand for Shea butter has increased by 600% in the last 10 years and, the total amount of Shea butter exported to EU countries rose from 2,500 tonnes in 1995 to 16,500 in 2007.

While Shea butter has become an important economic factor for West Africa, its preparation and extraction methods use great amounts of firewood that ultimately represent a large source of CO_2 emissions. At the same time, firewood collection for the preparation of Shea butter is also one of the main causes of deforestation in West Africa, especially in Ghana.

First of all, because of its long preparation and extraction techniques, it is estimated that 19.3 kg of CO_2 are emitted to prepare one kilo of Shea butter. It is also calculated that the total amount of CO_2 emitted to produce Shea butter for the European market in 2007 was equivalent to 298,417 tonnes in 2007.

Secondly, the firewood used in Shea butter production mostly comes from unsustainably-managed forests. This is particularly evident in Northern Ghana where, in combination with extensive slash-and-burn operations, indiscriminate logging and uncontrolled grazing, loss of forest cover due to firewood collection for Shea butter production has caused the serious depauperation of soil fertility and intense erosion superficial soil cover.

THE SHEA BUTTER CARBON PROJECT

The project plans to undertake the afforestaion and reforestation (A/F) of selected degraded lands in four Shea butter-producing zones across Ghana. A/F activities will also be combined with regeneration of native tree species to allow the natural regeneration of forest cover.

The project will support a participatory and collaborative effort within local communities to select appropriate sites. Local communities will also be highly involved in the setting up of workshops focused on the training of local farmers in order to accompany the introduction of improved woodland management techniques.

The aim of the project is also to integrate CO_2 sequestration operations into a broader institutional framework and to seek long-term carbon financing mechanisms that can be attractive to individuals as well as corporate and institutional clients.

PROJECT DESCRIPTION AND PROPOSED ACTIVITIES

The project is expected to conduct four main activities which can be subdivided in two main categories:

Protection and ecological restoration of native forest coverage

- Reforestation of degraded Shea woodlands and forest enrichment by planting in areas with low Shea tree density. The reforestation of existing degraded areas will be eventually passed on to local communities who will be in charge of managing and protecting them from grazing to ensure the permanence of carbon storage in the foreseeable future.

- Afforestation of new areas as an additional source of carbon credit.

The establishment of forest plantations and agroforestry systems to guarantee forest products and the provision of key ecological services such as CO_2 sequestration.

- Management of existing Shea woodlands in order to allow carbon emission reductions though sustainably-managed Shea woodlands.

- Establishment of woodlots of other three species that local communities will be able to exploit as an alternative and sustainably-managed source of fuel wood. The project will establish 6,000 hectares of forest plantation and agroforestry fields of Shea trees on areas that have been degraded over the past years. Those interventions are expected to significantly increase carbon stocks in above-ground biomass, litter, and dead wood as well as below the ground biomass and soil organic matter.

More specifically, the implementation of forest restoration systems for carbon sequestration will be subdivided as follows:

Type of Activity	Size
Protective- productive plantations such as community woodlots	1,000 ha
Assisted Natural Regeneration	1,000 ha
Agroforestry Systems	6,000 ha

The potential for carbon sequestration and the generation of carbon credits from current Shea woodland is vast in Ghana. It is estimated that there exist about 9.4 million naturally growing Shea trees in the counttry, each with an average carbon biomass of 0.27 tonnes. By extrapolation, it is possible to state that the Shea tress alone have a CO_2 sequestration potential of approximately 2.5 million tonnes per year.

As a consequence, the project will seek to accreditation by the Clean Development Mechanism (CDM) through the implementation of Afforestation/Reforestation (A/R) methodologies.

Initially, the first screening for project locations has been based on the eligibility criteria for degraded savannah ecological areas elucidated by UNFCCC. The proposed A/R CDM project activities are planned to take place in four regions of Ghana, namely the Northern, Upper East, Upper West and the Brong-Ahafo region, which collectively include 11 districts. Those four regions represent the main Shea-growing zones of Ghana and have a total human population of over 5 million people, equivalent to 28. % of the country's population.

The administrative map of Ghana

The project aims to strengthen community organizations through the involvement of local people in the decision-making process through the early identification of owners who are eligible and will consent to take part in the activities. Developers believe that it is essential for the success of the project to allow land owners to consciously choose suitable areas for the implementation of the activities following their own needs.

Local communities are expected to benefit from the improved management and forest conservation systems, mainly through income diversification stemmed from a broader spectrum of forest products, such as timber, fruits, and nuts. Moreover, in more than 50% of the project area, communities will obtain exclusive user rights to rehabilitate and manage the forest so as to generate income from a combination of wood products and emission reductions.

In addition, community-based workshops will be conducted in order to train local farmers to adopt improved forest management systems, particularly involving the minimum use of heavy machinery. For instance, tractor use will be limited to the transport of seedlings from nursery sites to lands on which they are to be planted. Also, the use of light hand tools such as hoes, machetes, and pruning knives will be encouraged to minimize the impact on soil and natural vegetation belts. Finally, minimum or no chemical pesticides or fertilizers will be employed in the selected project locations.

BASELINE SCENARIO

Based on 2009 data gathered by the developers of this project, the area in consideration has an average carbon stock of 9.15 tonnes per hectare. The CDM activities are expected to double tree density from the current 57 trees per hectare to over 100 trees per hectare in order to produce an average of over 67 tonnes of sequestered CO_2 per hectare. In total, the CDM activities are projected to produce 537,280 tonnes of sequestered carbon dioxide over a crediting period of 20 years.

STAKEHOLDERS AND PROJECT PARTICIPANTS

- Professor John C. Lovett, Centre for Technology and Sustainable Development, University of Twente, Enshede, Netherlands.

- Department of Horticulture, Institute of Renewable Natural Resources, University for Development Studies, Tamale, Ghana
- Dr. Peter N, Lovett of West Africa Trade hub, Accra, Ghana.
- Local communities in Ghana
- Ministry of Environment, Science and Technology, Ghana
- Ministry of Lands, Forestry and Mines, Ghana.

Designated National Authority in Ghana: the Environment Protection Agency

CONCLUSIONS

The demand for Shea butter is projected to increase rapidly in the next few years mainly because of a shift towards more natural ingredients for cosmetic products in Europe and the United States. While this can prove to be very beneficial for local communities in West Africa, the carbon-heavy Shea butter production techniques will represent a large source of CO_2 emissions as well as one of the main drivers of deforestation.

For those reasons, the Shea Butter Carbon Project will seek to achieve a Clean Development Mechanism accreditation in four degraded Shea butter producing areas in Ghana. The project will essentially consist of improved farm management systems combined with the afforestation of degraded land with more shea trees and the allocation of land for the reforestation of indigenous tree species to allow biodiversity restoration.

In this context, farmers will benefit from both an increased variety of forest products such as fruits and timber, and from the sales of carbon credits derived from the CDM market. Specifically, Shea Butter Carbon Project is expected to abate 537,280 tonnes of carbon dioxide over a period of 20 years.

While the main stakeholders to be involved in the project have been identified both at the local and institutional level, the activities are still at the design stage and technical issues concerning the methodological approach of the putative CDM accreditation have not been discussed yet. Typically, those issues will include the project boundary and the additionality of the project. Finally, the baseline scenario will necessitate further research to establish a definite carbon sequestration potential that can sustain the verification of an independent third party as required by the CDM approval process.

As the project can certainly be very beneficial to both local communities and ecosystems, its success will depend on how closely the developers will manage to involve institutional stakeholders and the Designated National Authority (DNA) in the elaboration and approval of the CDM accreditation.

ANNEX 5: WESTERN KENYA SMALL HOLDER AGRICULTURAL CARBON FINANCE PROJECT

PREPARED BY: ALICE RUHWEZA

MARCH 2010

BACKGROUND

Project Overview

The overall goal of this project is carbon sequestration through the adoption of sustainable agricultural land management practices (SALM) in Western Kenya. The project is located in the Western Kenya Region (Bondo, Siaya, Kisumu, and Bungoma districts) ranging from Upper midlands (UM4) slopes of Mt. Elgon to Low Midlands (LM4) shores of Lake Victoria Agroecological zones. The area is densely populated with small-scale agriculture land use on two major river drainage area – watershed (R. Nzoia and R. Yala) draining into Lake Victoria. The project developer – the NGO Swedish Cooperative Center-Vi Agroforestry [SCC ViA] is promoting the adoption of SALM practices on approximately 45,000 ha.[1] It is expected that a wide range of SALM practices will be adopted, including practices related to cropland management (e.g. cover crops, crops rotation, mulching, improved fallows, compost management, green manure, agroforestry, organic fertilizer, residue management) and rehabilitation of degraded land. Expected outcomes include that smallholder farmers in Kenya will be able to access the carbon market and receive additional carbon revenue streams through the adoption of productivity enhancing practices and technologies. Hence, economic benefits will be based on (i) increased yields and productivity, and (ii) additional income sources due to payment for environmental services. An important co-benefit will be enhanced resilience to climate variability and change. As an outcome indicator it is estimated that the project will generate in average about 60,000 tons of $C0_2$ equivalents per year.

The project is targeting smallholder farmers and small-scale business entrepreneurs organized in common interest groups, primary level cooperatives, farmer groups and informal organizations. SCC-ViA applies a participatory extension approach focusing on community empowerment, using tools and methods such as participatory rural appraisals [PRA], farmer field schools, agricultural training centers and farmer-to-farmer study tours. SCC-ViA extension staff provide demand-driven advice and training on all issues related to sustainable agricultural production and marketing. The extension staff work closely with other institutions such as the Ministry of Agriculture and the Kenya Forestry Service. SCC-ViA advice is also focusing on farm enterprise development. Farmer groups and organizations are strengthened through capacity building and development of entrepreneurial skills. Extension staff works with smallholders to organize farming activities as a business, react on market demands and integrate them into the value chain. Smallholder farmers are targeted to be empowered for a period of 6 years in intensive and less intensive phases.

Project Duration:

The project started in January 2009 and will run until December 31, 2029 (i.e. 20 years crediting period)

Targeted Emission Reduction

1.2 m t CO2e over 20 years; an average of 60,000 tCO2e per year; and an average of 1.4 tCO2e per ha per year. By 2029 the project is expected to have sequestered 1,236,373 tCO2 eq. but 60 % will be held to act as a buffer in case of non delivery or non permanence.

Land Tenure System

The project area is comprised of privately owned farms by individuals (farmers have title deeds).

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[1] The size of the project is 116,000 ha but only 45,000ha will be under SALM adoption area.

Institutional Arrangements

***Project Developer*:** Vi Agroforestry is the project proponent and administrator. They will also be in charge of administering carbon payments when they come in. Vi Agroforestry has employed field staff in 28 locations supervised by six zone coordinators. Field staff identify and facilitate formation of farmer groups, contract willing groups and train them. A farmer group ranges from 15-30 farmers committed to implementing SALM practices and reports to group leaders who in turn report to Vi Agroforestry annually. VI also provides advisory services, pays for technical capacity development of staff and farmers, and performs monitoring and project management and on behalf of farmers signs ERPA with the World Bank.

***Project Investor (also Carbon Buyer*):** The World Bank BioCarbon Fund (BioCF). The BioCF will sign Emission Reductions Purchase Agreements (ERPA) with Vi Agroforestry to purchase the carbon credits resulting from the project. The BioCF also offers Technical support in Development of methodologies and training together with *Unique Forestry Consultants* and *Johanneum Research Consulting Firm*. The World bank also facilitates meetings between Vi, BioCF investors, and carbon buyers. It disseminates information about the project globally in international forums.

Practices to Sequester Carbon

The project is promoting and implementing a package of sustainable agricultural land management (SALM) practices within smallholder farmer groups and creating reductions of emissions of greenhouse gases (GHGs) through carbon sequestration by trees and soil. Some specific practices include cropland management (cover crops, reduced tillage, manure, residue management, water conservation, agroforestry, multiple cropping) rehabilitation of degraded land (terracing etc.), livestock management (upgrading, fodder and forage management,) incorporating organic matter into the soils (crop residues, farm yard manure), sustainable agroforestry practices (using nitrogen fixing trees, more tree establishment within the farm, fodder trees for dairy animals, fruit trees for use by the family,reducing large less productive herds of cattle with fewer more yielding breeds of cattle, etc.

Methodology

The project, together with *the World Bank, Unique Forestry Consultants* and *Johanneum Research Consulting Firm* submitted an SALM methodology to the Voluntary Carbon Standard (VCS): www.v-c-s.org/methodology_salm.html (validation is on-going). The methodology focuses on encouraging six specific land management practices (tillage, manure additions and others) in three cropping systems (coffee, maize, and Napier grass) based on results of successful demonstration projects. The 28-page methodology relies on existing tools approved by the Clean Development Mechanism (CDM), as well as computer modeling and field-verified default values, to deliver a streamlined protocol that may open up soil carbon projects for other parts of Africa – where soils have deteriorated dramatically, threatening food security for millions of people. Other key methodology features include: activity-based monitoring using model based default values for C (e.g. production, residual use, livestock, fertilizer, manure, perennials, and cover crops). Crop yields shall be measured in local units per area unit annually and carbon monitoring is quantified by using Biomass and Soil carbon. Soil carbon is measured using an activity baseline monitoring survey done annually with default values and other models. Carbon is quantified annually at farmer groups levels and contracted groups will be paid at intervals of three to four years on delivery of carbon**.** The methodology is designed to be affordable enough for millions of impoverished farmers to restore degraded farmlands and boost yield (and "operationalize the concept of generating soil carbon financial assets in developing countries," according to the World Bank).

Farmer Organization

Farmers are sensitized to form small groups (membership of 15-30) and these groups are empowered through participatory needs assessment, training, and support to carry out record-keeping, monitoring, and reporting. Farmers sign a farmer commitment form to show their willingness to participate in carbon-smart activities within the group; the group keeps records, opens an account, and signs a contract with Vi Agroforestry. These groups become democratic entities with functioning administration and leadership. Some farmers are trained as farmer trainers. These are the groups that will be contracted by VI to sell carbon to the BioCF. Contracts are set until the 2029 crediting period. Payments are expected to be made within the first 10 years. Small groups that are not able to meet requirements such as production volumes, marketing, value addition, policy participation, lobbying, and advocacy can join together and form an umbrella farmer organisation.

Nature of Farmer Benefits

Small-scale farmers (with an average farm size of 0.70 ha) also gain from improved agriculture technology, increasing yields after improving soil fertility for food and income security, improving income from carbon payments, cash crops, and farm enterprise development. Farmers also gain new markets to sell timber, poles, fruits etc., improve soil and water quality in the area, and adaptat to climate change.

Support Services

Farmers' agricultural land management problems and training needs are identified and Vi Agroforestry field staff plan with farmers using community/group action plans or strategic plans and trainers to offer farmer friendly training. Demonstration plots, farmer learning centers, and trial and field schools are put directly in the community where farmers learn by doing and field staff constantly backstop farmers and follow up. Most training is offered by Vi field staff, but they also facilitate farmers to train one another. Farmers are in constant support by a field officer.

Key support activities include:

- Farmer enterprise development – more business-oriented kind of farming, which enables the smallholder farmers to earn an income from their farms. This is linked with training on marketing.
- Value addition
- Group approach and better organization of farmers through their own organizations as opposed to being alone and hence not being able to voice concerns
- Emphasis on soil health, rehabilitation of degraded farm lands
- Tree planting activities even in public places like schools and churches
- Sensitization of various farmer groups on the importance of SLM practices and support for farmers with various agroforestry tree seeds

Examples of training include: agroforestry, agronomic practices, livestock management, soil and water conservation options, land rehabilitation and restoration, group dynamics, village savings and loaning, farmer enterprise selection and development, organic farming, leadership and democracy (according to group needs), etc. Farmers are given tree starter seeds, some special seedlings and germplasms, and crop seeds only when demonstrating an activity. The group monitors farmers' SALM activities individually, including crop yields, biomass of trees, livestock management, farm enterprises, and household income.

A social survey is conducted annually to estimate community wealth status, socioeconomic or livelihoods (water access, energy, financial services or mobilisation, etc.)

Through strengthening of farmer groups and expansion of social networks, the farmers have a voice and can speak as one to local leaders and politicians, and link with other development agents/ NGOs/ government institutions.

Implementation Status

About 16,559 households have been sensitized and 8,128 committed. SALM practices have been implemented on about 7000 ha sequestering about 10,500 tCO_2 as of 2009.

Challenges

High costs of MRV (see Annex 1); investment barriers (lack of enough money to cover all requirements), institutional barriers (lack of capacity in institutions), technological barriers; barriers related to local tradition/prevailing practice (some farmers still stuck in old ways), barriers due to local ecological conditions (densely populated with small scale agriculture land use on two major river drainage area – draining into Lake Victoria), and barriers due to social conditions (need to understand local cultures and work within them).

Key Lessons Learned

- A good aggregator that can advise on agricultural practices is essential.
- The MRV system must be simple, accessible, and transparent to the farmer. The farmer should be able to easily access a table and tell how much payment he expects to receive. This kind of transparency encourages participation.
- MRV system must adapt to existing farming systems: particularly small-scale agriculture (farm size), diversity of farming systems, and assist small-scale farmers to reach their objectives.
- MRV must be cost effective, minimize transaction costs along (carbon) value chain.
- There is need to promote demand-driven advisory services.
- Projects must work within limited resources and capacity; acknowledge realities of limited national research systems and limited data availability.

Annex 1: Costs for Carbon Accounting

Direct measurement			Crop production & activity monitoring	
Project cost item	Total cost ($)	% of carbon revenues	Total cost ($)	% of carbon revenues
Carbon component	316,819	13%	316,819	13%
Carbon monitoring	872,740	35%	260,726	11%
Project implementation	1,293,600	52%	1,293,600	52%
Total costs	2,483,159	100%	1,871,145	76%

(Source: Tennigkeit and Woelkce)

Annex 2: Project proponents', including contact information

Role	Company	Contact
Project proponent	Vi Agroforestry Programme	Bo Lager, Programme Director P.O. Box 3160, 40100 Kisumu, Kenya Ph.: Tel +254 57 2020386; Email: bo.lager@viafp.org
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ANNEX 6: INVENTORY OF AFRICAN AGRICULTRAL CARBON PROJECTS

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