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Climate Change financing: what are the challenges and the opportunities for financing agriculture in Africa

FAO Policy Brief

By David Phiri, Louis Bockel, Marianne Tinlot

Summary

While agriculture is a significant contributor of greenhouse gas emissions, which will need mitigating, it also provides opportunities for significant carbon storage, for example, in tree crops and in soils. In fact, the global sequestration potential through increasing organic soil carbon via improved agricultural practices is estimated to be 1 to 6 Gt of carbon per year.

In Africa, one of the most significant consequences of conventional agriculture is the rapid depletion of soil organic matter (SOM). Repeated cultivation and use degrade soils and lower crop yields while increasing production costs.

African farmers have the potential to both reduce greenhouse gas emissions (GHG) and increase agricultural yields. The technical mitigation potential of agriculture by 2030 in Africa reaches 2Gt of CO_2-eq per year (IPCC,2007). With the promise of emission reductions, carbon finance could underwrite the training of farmers in new practices as well as the establishment of MRV systems to track that both carbon and agricultural benefits are accrued (STRECK and al, 2010[1]).

As potential interest in African agricultural carbon projects grows, the pipeline of prospective projects is also expanding. Current performing carbon funded projects present four main similarities: (i) To have a clearly defined geographic delimitation, (ii) to have one aggregator which is a main organization grouping the beneficiaries and providing an eventual channel to provide incentives to beneficiaries, (iii) to have a clearly quantified carbon reduction target based on GHG calculator as FAO EX-ACT, (iv) to have access to carbon funding support.

[1] *Streck, C et al, An African Agricultural Carbon Facility, ford foundation, 2010*

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Climate Change financing: What are the challenges and the opportunities for financing agriculture in Southern Africa

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For

Food and Agriculture Organization of the United Nations, FAO

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Abbreviations

AfDB	African Development Bank Group
AGF	African Green Fund
CAADP	Comprehensive Africa Agricultural Development Programme
CDM	Clean Development Mechanism
EX-ACT	Ex-Ante Carbon-balance Tool
GHG	Green House Gas
ICRAF	World Agroforestry Centre
IPCC	Intergovernmental Panel on Climate Change
MRV	Monitoring, Verifying and Reporting
NGO	Non Governmental Organization
PES	Payments for Environmental Services
REDD	Reducing Emissions from Deforestation and forest Degradation
SOM	Soil Organic Matter
VCS	Voluntary Carbon Standards

1. Agriculture potential of climate mitigation

The IPCC estimates that the global technical mitigation potential from agriculture by 2030 is approximately 5,500-6,000 Mt CO_2-eq/yr. (Smith et al., 2007). Soil carbon sequestration would be the mechanism responsible for most of this mitigation, contributing 89 percent of the technical potential. Therefore, agriculture has the potential to change from being a significant source of GHG emissions to being a much reduced emitter and possibly to function as a net carbon sink within the next 50 years. The most important opportunity for GHG mitigation is the application of carbon-rich organic matter (humus) into the soil. This would significantly reduce the need for fossil fuel based and energy intensive mineral fertilizers and be a cost effective means of sequestering atmospheric carbon. Further GHG mitigation gains could be achieved by improving yields on currently farmed lands and reducing deforestation pressures and by adopting no/low tillage practices that reduce fuel usage.

Africa contributes only 3.8 percent of greenhouse gas concentrations in the atmosphere, but it will suffer worst impacts of climate change. This is because of limited mechanisms and resources to mitigate and adapt to this significant change from one climatic condition to another. However African agriculture accounts for 13% of global agricultural GHG emissions, and the amount is expected to rise rapidly in the future.

Investments aimed at increasing productivity of agriculture sector have proved, among other benefits, to be far more - at least twice as much - effective in reducing rural poverty than investment in any other sector (AfDB[2], 2010).

Some agricultural practices can cause significant emission of greenhouse gases. For instance, land clearance with fire, irrigated rice practices, and artificial fertilizer usage. To mitigate these emissions and adapt agriculture to a changing climate would entail profound changes, such as a green transformation with widespread moves towards more sustainable land and water management. For example, indigenous knowledge regarding some technical options, and minimum tillage cultivation could be applied in greater harmony with the natural environment. With regards to adaptation, there is an urgent need to develop crops that are more resilient to drought, heat, and pest infestation. In order to find these genetic keys, scientists need to explore the wild relatives of common crops. For this reason, it is important to maintain traditional plant varieties. In fact, adaptation linked to agricultural biodiversity is expected to avoid 10 to 15 per cent of the projected reductions in yield under changing climatic conditions.

In a 'Green Economy' with a low-carbon development pathway, there are new opportunities for carbon lock-up from changing crops, land-use and cultivation practices. Trading these would help diversify rural incomes and finance adaptation practices.

[2] African Development Bank Group. 2010. Agriculture Sector Strategy 2010 – 2014. page 6. available at http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Agriculture%20Sector%20Strategy%2010-14.pdf viewed on 31 August 2010.

2. African Potential to mitigate Climate change

One of the most significant consequences of conventional agriculture is the rapid depletion of soil organic matter (SOM). Repeated cultivation and use degrade soils and lower crop yields while increasing production costs. The sector is likely to be severely impacted by climate change, and cannot continue in its present unsustainable way. The agricultural sector needs reform to attain much greater harmony with the natural and human environment. This is in tune with the principles of a Green Economy, and the ongoing Comprehensive Africa Agricultural Development Programme (CAADP) agricultural reform process.

In brief, the reality is that Africa's ability and means for mitigating climate change lies in agricultural and terrestrial carbon. This contribution would concurrently bolster African food security, through increased investments in sustainable land management practices that are carbon-friendly. Agricultural carbon activities also offer significant co-benefits through rehabilitating degraded soils, increasing productivity of agricultural landscapes, and expanding capacity of communities to cope with both food provision demands as well as environmental stresses.

African farmers have the potential to both reduce greenhouse gas emissions (GHG) and increase agricultural yields. With the promise of emission reductions, carbon finance could underwrite the training of farmers in new practices as well as the establishment of MRV systems to track that both carbon and agricultural benefits are accrued (STRECK and al, 2010[3]). Streck proposal is opening a wide range of practical questions to African decision makers on the way to operationnalize such carbon finance channels.

Eric Bettelheim, Executive Chairman of UK-based Sustainable Forestry Management, said developing countries must be paid to keep their remaining forests but the credits could triple the value of existing forests as well as provide a tasty incentive to set more land aside for afforestation programmes. "This kind of money can transform economies because it is trade not aid," said Bettelheim. "Poor farmers must receive increased payments and productivity or there will be no solution to global warming, no post-2012 treaty and no functioning tropical forest ecosystems by the end of the century."

3. Payment of Environmental Services and Carbon Funding

At farm level, with an estimated sequestration potential of 3 tCO2e per ha and year, African farmers could receive additional revenues of US$ 30 per ha per year (assuming a carbon price of US$10/TCO2e). This amount would constitute significant additional resources, since for example most Ugandan farmers receive a net income from maize of about US$15-30 per ha per year.

[3] *Streck, C et al, An African Agricultural Carbon Facility, ford foundation, 2010*

Healthy ecosystems provide a variety of vital goods and services that contribute directly or indirectly to human well-being. However most of them are currently in decline, and making their value clear to those who benefit from them but are not direct land users can encourage investment in their protection and enhancement.

Payments for Environmental Services (PES) are one type of economic incentive for those that manage ecosystems to improve the flow of environmental services that they provide. Generally these incentives are provided by all those who benefit from environmental services, which includes local, regional and global beneficiaries. PES is an environmental policy tool that is becoming increasingly important in developing and developed countries and that interest in addressing an environmental problem through positive incentives to land managers.

As poverty is a major cause of environmental degradation, rewarding poor producers to adopt more environmentally friendly systems of production would result in both environmental benefits and poverty reduction (FAO[4], 2010). Existing PES initiatives have focused on three kinds of activity:

- restoring natural habitat or tree planting
- maintaining existing natural habitats and protecting them from incursion (forest, grasslands conservation…)
- improving existing land use (soil conservation, efficient inputs use…)

Incentivizing Better Soil Management: An important element of sustainable management of soil fertility is introducing crop rotation planting practices that emphasize cultivation of nitrogen fixing crops to replenish soil nutrients through biological processes. Implementation may require financial and technical assistance to farmers as they adopt or more intensively implement these rotation strategies. The cost of legume and other N-fixing crop seeds and seedlings may require some level of initial support, particularly if local markets for these intermediate crops are not well established.

4. Carbon Funds available in Africa

4.1 Conditions for eventual access to mitigation funds

There are many ways and efforts underway to reduce carbon emissions and promote activities which help to store and remove carbon. This has made **carbon** a valuable economic commodity. To find a common unit for this commodity all GHGs are converted to CO_2 equivalents (CO_2-eq).

[4] FAO website on Payments for environmental services from agricultural landscapes. Available at: http://www.fao.org/es/esa/pesal/index.html

The CO_2-eqs are traded on **carbon markets**. The markets work in a similar way to financial markets. The currency used on these markets is **carbon credits** (Seeberg-Elverfeldt[5], 2010).

In the carbon trade in simple terms an agreement is made between a buyer and a seller of carbon credits. Those who reduce emissions or sequester carbon, receive payments and those who have to decrease emissions can buy carbon credits to offset their emissions. "**Carbon offsetting**" means to compensate emissions which cannot be avoided by paying someone else to save – sequester - GHGs. The prices which are received for one ton of CO_2 vary a lot and depend on the type of market and the type of carbon offset project. During 2009 the prices *ranged from* €1.90 to €13 per ton of CO_2-eq. Over the last few years several financial instruments mechanisms and markets have emerged[6]. The main climate funds are shown in the figure below (World Bank, 2010).

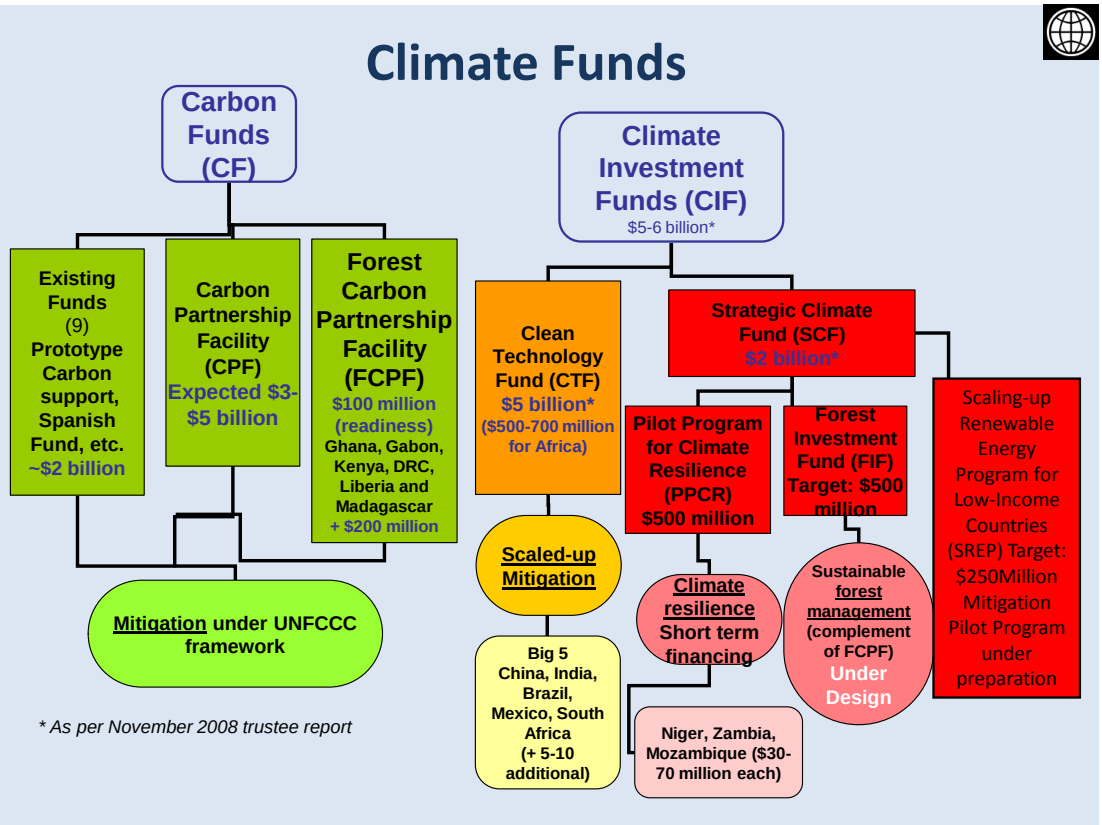

Figure1: Main World Bank climate funds. Source: World Bank, 2009.

[5] Seeberg-Elverfeldt C, Carbon Finance Possibilities for Agriculture, Forestry and Other Land Use Projects in a Smallholder Context, NRD, FAO, 2010 http://www.fao.org/fileadmin/templates/ex_act/pdf/carbone_finance.pdf

[6] For an overview of additional funds see the **Climate Funds Update**. This is an independent website that provides information on the growing number of international funding initiatives designed to help developing countries address the challenges of climate change. http://www.climatefundsupdate.org/

4.2 Main Climate funds available

There is increasing potential for African countries to be involved in voluntary markets for carbon and international market mechanisms such as the Clean Development Mechanism (CDM). Knowledge and strategies to reduce carbon emissions through community based afforestation and reforestation projects, agro-forestry and reduced deforestation and degradation (REDD) are being generated, but need to be tested and adopted. These strategies have the potential to create synergies for increasing productivity and achieving the multiple functions of agriculture for the benefit of smallholders.

Of the 22 climate funds globally available, none is hosted in Africa. The 2009 UN climate change conference (COP 15) held in Copenhagen has secured a non-obliging political agreement to make USD 30 billion available by 2012 in new and additional fast track resources, with additional USD 100 billion to be raised annually by 2020. African leaders have asked for at least 40% of the resources to be allocated to Africa and to be managed by the African Development Bank

African smallholders could boost earnings if soil carbon was included in future compliance markets. Assuming an economic mitigation potential of 265 million tons CO2e per year by 2030 (IPCC, 2007) and a price of US$ 5-10 per ton of CO2e, an income stream of US$ 1.5- 2.7 billion per year could be realized. This amount is almost twice as high as the annual ODA flow to African agriculture between 1996 and 2004 (Cervigni, 2010).

However carbon markets access remains complex for agriculture projects and requires costly monitoring and procedure. Designing and developing a carbon project takes a long time, requires a lot of technical expertise and considerable financial resources for the initial set-up. Therefore, it is important to identify a project developer and donors at a very early stage of the project to facilitate the process and to arrange for specific early (up-front) payment or compensation arrangements for the involved farmers (Seeberg-Elverfeldt, 2010).

New initiatives are emerging. A Proposal of an African Green Fund (AfDB, 2010) has been discussed during The Seventh African development Forum (Oct 2010). The consultation platform discussed the proposed AGF as an instrument to enable the African Development Bank to receive and manage resources allocated to Africa from all sources including the fast-track financing and long term pledges made under the Copenhagen Accord. The hosting and managing of such Fund in Africa by the African development Bank will enhance Africa's access to the much needed global resources for the purpose of tackling the challenges of climate change on the continent.

4.3 Carbon Value chain approach

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 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, given 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 (An African Agricultural Carbon Facility, 2010).

More integrated approach to appraise how the different stages and processes of a value chain can be organized so that they respond positively to or even contribute to a decrease of negative consequences from climate change.

5. Current experiences of Carbon funding in Eastern and Southern Africa

Current performing carbon funded projects present four main similarities:

- To have a clearly defined geographic delimitation;
- To have one aggregator which is a main organization grouping the beneficiaries and providing an eventual channel to provide incentives to beneficiaries;
- To have a clearly quantified carbon reduction target based on GHG calculator as FAO Ex-Ante Carbon-balance Tool (EX-ACT);
- To have access to carbon funding support.

5.1 Kenya Smallholder Agriculture Carbon Finance Project as SLM example

This Western Kenya Smallholder Agriculture Carbon Finance Project is aimed at restoring soil productivity, farm enterprise approach, and carbon sequestration. The project area is Kisumu & Kitale in Western Kenya with 80,000 ha. The project entity is VI Swedish Cooperative Center. The aggregator role is played by Farmers Associations which is grouping 60,000 farms. The emission reduction is estimated at 134,000 t CO_2/ha/year.

5.2 Kenya Coffee Sector Agricultural Carbon Finance Project, as value chain example

The project objectives are to improve practices for production of specialty coffee, and carbon sequestration. The project area is Near Mt. Kenya in Central Kenya. The project entity is ECOM Agro-industrial Corporation. The Aggregator role is played by Komothai smallholder farmers cooperative, which gathers 9,000 farms. Emission Reductions are estimated around 31,000 t CO_2/ha/year during 20 years.

5.3 The Kasigau Corridor REDD Project, as REDD example with transfer of carbon rights

Twelve years ago Wildlife Works acquired conservation rights to 75,000 acres of degraded forest land in Coast Province, Taita Taveta District Kenya in an important wildlife corridor between Tsavo East and Tsavo West National Parks. They established a conservation based development project, with the goal of providing communities with real economic alternatives to Slash and Burn. They gained support from the community in restoring the wildlife to the ecosystem. In 2009 with REDD becoming viable in the voluntary market (VCS), they launched Kenya's first REDD project to expand the protection to the entire 500,000 acres of the Kasigau Corridor to bring conservation related income to over 3,000 Kenyan shareholders of the land.

There are several communities located near the project area. The project area is primarily low density forestland, shrubland and grassland savannah. This land is a private leasehold estate given by the Government of Kenya to Rukinga Ranching Company Ltd. The majority shareholder of Rukinga Ranching Company is BenBo International, an offshore trust. There are 46 shareholders of Rukinga Ranching Company, including BenBo International. BenBo International was established by a principal investor of both Wildlife Works Inc. and Wildlife Works Carbon LLC. Wildlife Works Inc. is an export processor of consumer goods to retail markets in Europe and the United States. Wildlife Works Inc. supports the conservation of wilderness habitats, the creation of jobs and the construction of schools. Wildlife Works Inc. was granted a conservation easement from Rukinga Ranching Company in 2009 after the project start date of January 1, 2006. This easement effectively transferred all carbon and biodiversity rights from Rukinga Ranching Company to Wildlife Works Inc. Wildlife Works Inc. and Wildlife Works Carbon LLC have initiated or will initiate the project activities and collectively these entities are referred to as "the project proponent" in the context of project activities in the validation report.

Experience learning:

- We can implement self supporting REDD projects for an initial investment of between $10-12 per hectare;
- We can complete biomass sampling at a rate of 100,000 hectares per month with a team of 10 local people;
- We can generate $20-50 per hectare per year in REDD gross revenues;
- Carbon income can be used as start up capital for other sustainable development business ventures to create alternative income streams;
- We have a unique combination of business and conservation skills that allowed us to make this happen fast;
- There are lots of places in Africa that need this solution – we would like to help and we have private sector funding.

5.4 An expanding pipeline of prospective projects

Country & Project Name	Key Institutions	Climate-Friendly Practices Promoted	More Information
Ethiopia: Humbo Assisted Regeneration	• Community has developed 7 community cooperative societies • The Ethiopian Forestry Department, and the Ethiopian Agriculture, Rural Development and Forestry Coordination Office, in collaboration with World Vision, jointly implement the project	Farmer-Managed Natural Regeneration (FMNR) approach in which existing tree and shrub root material in the soil is identified, selected, pruned, and managed to enable re-growth. Only native species.	http://wbcarbonfinance.org/Router.cfm?Page=ProjectReport&ProjID=9625
Kenya: Green Belt Tree-Planting Project	• Community Forest Associations plant the trees • NGO Greenbelt Movement manages projects, aggregates credits and sells to the World Bank • Kenya Forest Service owns the land and gives the carbon and NTFP rights	Tree planting with a long term goal to use the re-grown forest in a sustainable manner for a variety of products	http://wbcarbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects&ProjID=9635
Kenya: Smallholder Coffee Carbon Project	• Project developer is ECOM Agroindustrial Corp.which is working with Komothai smallholder farmers cooperative to aggregate	Transitioning from full sun to shade grown coffee	http://siteresources.worldbank.org/INTARD/Resources/335807-1236361651968/Timm_RWsideevent.pdf
Kenya: Western Kenya Smallholder Agriculture Carbon Project	• Project developer is VI-Swedish Cooperative Centre (SCC) • Farmer associations aggregate the credits	Farm enterprise approach adopting sustainable agricultural land management practices and planting fruit and fuelwood trees	http://siteresources.worldbank.org/INTARD/Resources/335807-1236361651968/Timm_RWsideevent.pdf
Tanzania: Uchindile and Mapanda Forest Project	• Green Resources developed reforestation project validated and registered according to the VCS standard	Tree planting	http://www.forestcarbonportal.com/inventory_project.php?item=282
Uganda: Trees for Global Benefits	• Farmers receive carbon payments directly • Ugandan NGO Ecotrust manages projects and acts as aggregator • USAID supports baseline costs	Trees planted provide for soil conservation, food (cashews), fodder for livestock and medicinal values	http://www.planvivo.org/fx.planvivo/scheme/ugandadocuments.aspx
Zambia: ICRAF	• ICRAF project focused on intercropping in maize farming systems	Gliricidia-maize intercropping system with application of gliricidia prunings to soil	http://worldagroforestry.org/af/

Table 1 : Examples of projects developed under carbon financing. Source: Streck, C et al, An African Agricultural Carbon Facility, ford foundation, 2010.

As potential interest in African agricultural carbon projects grows, the pipeline of prospective projects is also expanding. Charlotte Streck provides some examples of project in the report proposing an African Agricultural Carbon facility (2010) in the table below, it provides illustrative examples of the diverse types of projects, farmers, and developers. Many more are in the pipeline, supported by private, government, inter-government and civil society organizations.

Due to the already established eligibility of afforestation / reforestation, the first generation projects with farmers are focused on agroforestry tree-planting. However, a growing number of pilots are exploring the potential of agriculture and soil carbon projects.

6. Lessons learned and recommendations

6.1 Public fund and farm subsidy retargetting

Redirecting Farm Subsidies Toward Investments in Green Agriculture: Current national government subsidies for agriculture encourage and incent the continued reliance on fossil fuel dependent farming. These subsidies effectively distort and reduce the costs of unsustainably sourced external inputs (e.g. chemical fertilizers, pesticides, fuels, electric power, water, etc.). They also reward farming practices that focus on production of a few global commodity crops and essentially ignore the value of crop diversity and sustainable stewardship of the land.

At a general level the key challenge is removing subsidies that serve to maintain the agricultural status quo; while reallocating such subsidy resources to programs that create a system of helpful incentives that enable the accelerated implementation of green agriculture practices. In particular, subsidization of farmers' initial ecological agriculture transition costs would help finance needed investments in locally sourced organic fertilizer and other inputs; the use of No Till cultivation equipment; and defray some of the risks involved in changing farming practices. A principal enabling condition needed at the local level is the strengthening of rural capacities for improved self-reliance in green agriculture inputs.

6.2 Capacity building on SLM

There is an urgent need to promote and build capacity for the FAO initiative for Sustainable Land Management (SLM) in Africa. This knowledge based procedure helps integrate land, water, biodiversity, and environmental management including input and output externalities to meet rising food and fibre demands while sustaining ecosystem services and livelihoods (World Bank, 2006). SLM, if promoted by national governments, could reduce the region's dependence on natural factors like rain-fed agriculture and natural soil fertility which cannot withstand the pressures of climate change.

TerrAfrica is a partnership that aims to address land degradation by scaling up harmonized support for effective and efficient country-driven SLM practices in Sub-Saharan African countries. Activities under the work program are organized around three mutually reinforcing Activity Lines – Coalition Building, Knowledge Management and Investments – which together aim to generate the coalitions, advocacy, 'know-how', policies and investment packages necessary for full and effective mainstreaming, up-scaling and financing of SLM.

6.3 A carbon appraisal and monitoring capacity

Carbon balance appraisal is a precondition to consider possible funding by carbon market or carbon funding. In this perspective FAO has developed EX-ACT as specific tool to allow for a quick appraisal of the potential mitigation impacts of agricultural investment projects, available to donors and planning officers, project designers and decision makers within agriculture and forestry sectors in developing countries.

The EX-ACT tool[7] computes the carbon balance with and without the project. The difference represents the potential impact of the project in terms of mitigation, indicating the net amount of carbon sequestered (carbon sink) or emitted (carbon source) as a result of the project.

6.4 Main recommendations

A Greener approach integrating sustainable agriculture intensification could be of great benefit to much of African agriculture, but it will require that existing institutions manage the demands for 'greening' agriculture in order to benefit from major opportunities for carbon sequestration and mitigating emissions through improved agricultural practices in order to raise rural incomes.

There are opportunities for African countries to participate in global carbon markets through the agriculture sector, if African countries update their mastering of such fund mobilisation together with effective carbon monitoring within agriculture sector. Specific regional institutions are put on place to allow such capacity building through CLImDEV built as an AfDB-UA-UNECA partnership which includes also ACPC (African Climate Policy Centre) as policy support and training provider. The partnership on climate change support should be completed by the proposal of an African Green Fund proposed by AfDB (see above). This Regional institution facility is widely completed by a panel of International initiatives often built around Public – Private-Partnership such as African Agriculture Carbon Facility, the Alliance for Green Revolution in Africa, the Partnership for African Environment Sustainability.

Some points should be raised to include agricultural mitigation within mitigation financing to fit financial delivery systems with the needs of agricultural producers:

- aggregation where upscaled and broad approaches can be applied;
- flexibility to meet investment/cash flow requirements (upfront financing) and reduce risks of farmers transitioning to new systems;
- fair and equitable systems agreed for land use managers to be recognized and rewarded for mitigation they provided;
- innovation in linking and leveraging across public and private and carbon and non-carbon sources of finance, including co-funders for co-benefits;
- Appropriate Carbon balance appraisal tools (EX-ACT) and MRV Monitoring.

[7] http://www.fao.org/tc/tcs/exact/ex-act-home/en/

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