Annotation: *This summary of findings of the* ***Western Kenya Soil Carbon Project*** *guides decision makers and project developers on most important aspects to* ***unlock finance from the Voluntary Carbon Market*** *(****VCM)*** *for* ***poverty reduction, food security*** *and* ***climate adaptation*** *and* ***mitigation*** *while considering relevant* ***safeguards****. The guidance is based on a soil-carbon certification pilot, implemented by SV BoDeN+ in Western Kenya on behalf of BMZ.*

Opportunities and challenges for soil carbon certification schemes in sustainable agriculture

1. Introduction

Carbon certification offers opportunities for food security and climate change mitigation in developing countries

Carbon certificates can play a role to balance historic and future unavoidable emissions and to channel private finance to development efforts. The Agriculture, Forestry, and Other Land Use (AFOLU) sector can provide 20-30% of the global mitigation required for a 1.5 or 2°C pathway until 2050.[1] The large potential of the agricultural sector should be tapped to exploit opportunities for climate change mitigation, and simultaneously contribute to food security and climate change adaptation. Sustainable land management (SLM) enables climate resilient land use intensification, which avoids additional emissions by conversion of natural land. Co-benefits for smallholder farmers changing to sustainable agricultural practices and agroforestry show promising impacts for food security, poverty reduction, gender equality, soil-health, and sustainable agricultural intensification. GIZ implements on behalf of BMZ activities to access financial resources from voluntary carbon markets to develop an operational long-term approach for financing SLM with a view to tapping its potential for increased climate resilience.

2. Background

The findings are based on the Western Kenya Soil Carbon Project as well as carbon scheme feasibility studies implemented in Madagascar and India.

The Western Kenya Soil Carbon Project

The GIZ SV BoDeN+ Project[2] develops a pilot carbon project using an efficient measuring, reporting and verification (MRV) system, which measures the climate impacts of soil protection measures according to the Verra “Verified Carbon Standard”. SV BoDeN+ qualifies a local coordination entity, which coordinates the certification of the climate effectiveness of soil conservation measures on 32,000 ha in Western Kenya. About 40.000 farmer families participating in the carbon project received extension services focused on SLM from the *GIZ Project ProSoil Kenya*[3]. The farmer families benefit from the proceeds of the carbon revenues through access to bi-annual extension services on SLM practices for the next 20 years. Currently the extension services in the region, mostly donor funded, assure one extension contact per year. The main benefits of the carbon scheme are higher and climate risk-adjusted yields, improved food and income for farmers, and climate change mitigation via increased carbon in soils and plant biomass.

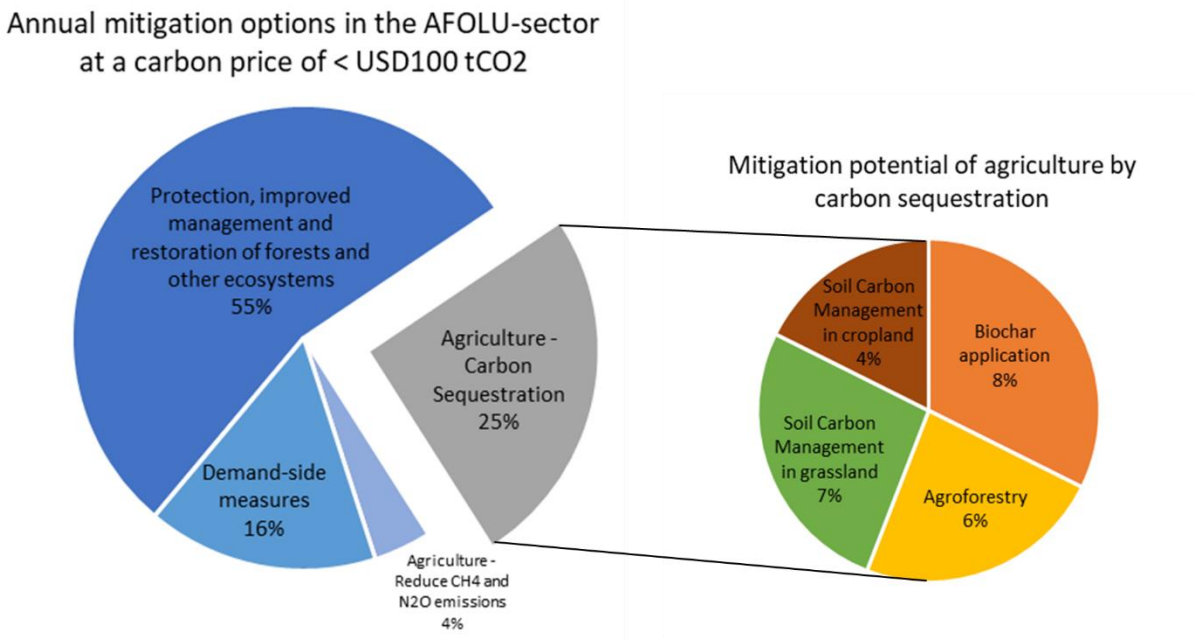
[1] IPCC (2022)
[2] GIZ Sector Project Soil Protection, Combating Desertification, Sustainable Land Management
[3] GIZ Global Programme Soil Protection and Rehabilitation for Food Security

The role of soils and agroforestry for agriculture in developing countries

Soil organic carbon (SOC) is necessary for soil fertility and stability. Its improved content contributes to increased productivity of agricultural land[4] and leads to higher yields, reduced yield variability and reduced yield gaps caused by droughts.[5] These factors contribute to enhanced food security, climate adaptation and mitigation. This is particularly important for smallholder farmers on tropical soils in developing countries, which depend on rainfed agriculture and are often constrained in their adaptive capacity[6].

The AFOLU sector accounted globally for around 21% of total anthropogenic greenhouse gas (GHG) emissions between 2010-2019.[7] The largest mitigation potential within the land use sector lies in protection, improved management, and restoration of forests and other ecosystems, amounting for 55% of the total mitigation potential of the AFOLU sector, followed by agriculture, contributing 29% of the mitigation potential (see figure 1). In agriculture the highest mitigation potential is associated with biochar application, followed by soil carbon management in grassland, agroforestry[8], and lastly soil carbon management on cropland.[9] Demand-side measures contribute 16% of mitigation potential.

Figure 1: Annual mitigation potential in the AFOLU sector at a carbon price <USD100 tCO2-eq-1, with the total mitigation potential of the land-use sector being 13.6 GtCO2-eq yr-1 (based on IPCC (2022). WG III contribution to the Sixth Assessment Report, Chapter 7: Agriculture, Forestry and Other Land Uses (AFOLU), p. 44 ff.)



There are various ways to build up SOC and above ground biomass, while increasing crop production: Biochar application, SLM practices (e.g. use of cover crops, improved tillage) including agroforestry.[10]

Along with improved SOC and agroforestry, several co-benefits such as climate change adaptation, increase in biodiversity, economic resources and environmental benefits contribute to Sustainable Development Goals (SDG; SDG1, SDG2, SDG13 and SDG15).[11]

[4] Baveye et al. (2016)
[5] Rumpel and Chabbi (2021)
[6] smallholder farmers especially face barriers such as lack of access to finance, inputs, and knowledge.
[7] IPCC (2022)
[8] "Agroforestry is a set of diverse land management systems that integrated trees and shrubs with crops and/or livestock in space and/or time." (IPCC (2022), p. 65)
[9] IPCC (2022)
[10] VCS (2011)
[11] Second Nature (2019)

Voluntary Carbon markets

Under the Paris Agreement, Article 6 provides the option for countries to reduce their GHG emissions using international carbon markets. Besides *compliance markets*, at which carbon emission pledged by Nationally Determined Contributions (NDCs) can be traded between countries, the Voluntary Carbon Market (VCM) focuses on trading additional carbon emissions between private sector, NGOs, or individuals only. Transactions are voluntarily and not accounted under regulatory or compliance systems. The sale of emission certificates, usually to large emitting corporates, provides financing to foster an increase in SOC and forest stocks on agricultural land, by applying changes of agricultural practices. Such a certification schemes are usually organized by a separate entity, implementing a monitoring system for the climate effects, enable farmers to change their practices and assures compliance with a certification standard. VCMs are not regulated. Agreements between private sector participants are negotiated on basis of individual projects. Thereby **VCMs are closing gaps of regulated carbon markets and represent innovation hubs** for climate effective approaches in land use and agriculture. Generally, voluntary carbon markets fill a gap where regulatory action is insufficient or absent.[12] In the future, approaches from the VCMs are expected to be integrated and scaled into regulated carbon markets. Current trends in the carbon market for agriculture are a development to a demand market due to corporate net-zero pledges and a higher demand for certificates providing additional SDG related impacts.

The demand for high-quality emission credits from the AFOLU sector increased substantially since 2016 with most of the credits issued from forestry related projects. Correspondingly, an increasing number of VCM methodologies and protocols are being developed to cover a variety of activities, project types and geographical contexts. Relevant internationally recognized certification standards, which verify and validate the carbon credits, are **"Gold Standard" (GS), the Verra "Verified Carbon Standard" (VCS) or "Plan Vivo"**. The Clean Development Mechanism (CDM) has almost no significance for the voluntary carbon market anymore, because of its inability to ensure additionality within its projects.[13] GS only rarely certifies projects in the agricultural context, while focusing on improved tillage as well as the application of recycled pulp and paper, and only recently developing new activities regarding improved grassland management and improved grazing.[14] At present, VCS is the most suitable and globally recognized certification standard for soil carbon related activities for smallholders, because of its broad range of eligible practices, accounting for activities such as agroforestry, improved cropland management or improved grazing. A methodology to use biochar in agriculture is currently drafted under the VCS.[15]

3. Important aspects for safeguarding development impacts

Environmental integrity

The logic of SOC crediting is that SOC content in the baseline scenario (business as usual) is compared to the SOC content in the improved land use scenario. The difference between the SOC content can be credited. **Permanence** refers to the assurance that the credited carbon will remain in soils or, in the case of agroforestry, woody biomass, during the period of the offset credits.

A lack of permanence of carbon sequestration over time constitutes a project risk. Carbon sequestered can be released again to the atmosphere during or after the crediting period. For example, decomposition of freshly accumulated SOC can be induced by a change in land use

[12] Streck (2020)
[13] Yonn (2022)
[14] Gold Standard (2021)
[15] VCS (2021)

or weather extremes. These risks are accounted for by applying a **non-permanence-risk buffer** for certification projects. The non-permanence-risk buffers are estimated considering political and governance risk, program design and strategy risk, carbon rights and use of carbon revenues, funding risk, and natural risk. Credits from the buffers are used to replace reversed emission reductions. In the western Kenya project pilot for example 45% of the certificates are set aside to account for non-permanence risks. 30 % of the credits set aside, will be released gradually along the bi-annual verification of the project impacts. 15% of the credits set aside will be released after the project duration if the permanence is sufficient. Carbon sequestration in smallholder agriculture environments is considered as less secure regarding permanence than agroforestry methods or the use of biochar. In the western Kenya project pilot for example 60% of credits are based on agroforestry and 40% on SLM practices.

Other risks associated with the environmental integrity of carbon projects are **additionality**, **double-counting,** and **leakage**. The **additionality** criteria secures that only mitigation activities are supported which would not have happened without the incentives from carbon credits. To prove additionality, there exist various approaches, such as barrier, investment, or common practice analyses.[16] To avoid **double counting** of emission reductions, only one carbon scheme can implement a certain standardization method in the same area. Some stakeholders recommend to secure double counting of voluntary carbon project emissions in the accounting system for the Paris Agreement. **Corresponding adjustments** is a tool for compliance markets designed to promote the integrity of emissions accounting under the Paris Agreement.[17] If one member state invests in emission mitigation in a second member state, both states need to adjust their climate accounting accordingly (the investing member state can account the emission reductions towards their NDCs, while the second state needs to increase its ambitions). These corresponding adjustments are not necessary for the VCM. The VCM should be seen as complementary to efforts for achieving mandatory GHG goals, and as opportunity to “fill a gap where regulatory action is insufficient or absent”[18]. Also, requiring developing countries to account emissions from VCM projects is unrealistic as often their accounting systems are insufficient to track these emissions.
Leakages occur when emissions are reduced or removed in the project area but reappear beyond the project boundary. For SOC, leakage typically arises through biomass sourcing outside the project area, e.g. by collecting fodder outside the project area for livestock, to make biomass inside the project area available as feedstock for SOC. By comprehensive collection of data prior to the project and its evaluation within an impact assessment, possible risk areas for leakages can be estimated. Based on the protocol from the certification body, the viability of the project is defined.[19]

Social integrity
Carbon certification schemes, like development projects, affect socio-economic and environmental systems beyond the activities which generate carbon credits. A participatory and gender-sensitive involvement of stakeholders in the project design and implementation process, is important to secure long lasting incentives for participation in carbon schemes. In response, relevant standards require proof for stakeholder engagement and consultations. Within this discussion, **benefit sharing mechanisms** play a major role. Benefit sharing mechanisms allocate the revenues from emission credit sales and aim to reward mitigation efforts by compensating actors that face new costs. With current carbon price levels, agricultural benefits (e.g. higher yields) provide a stronger incentive for farmers for behaviour change than additional monetary income from credit sales as direct payments. In the case of the Western Kenya Soil Carbon Project, the revenues are reinvested into agricultural extension

[16] VCS (2021)
[17] Streck (2020)
[18] Vgl. Streck (2020)
[19] VCS (2022)

services. This **community benefit** is distributed equally among households participating in the scheme independent on the carbon sequestered or size of land. In comparison to direct payments rewarding investments to SALM practices to individual farmers, the community approach better reaches weaker, smaller, or female-led farmer households equally. However, it needs to be ensured that the way advisory services and other benefits are set up responds to the needs of these groups (e.g. considering language, educational level, time availability, socio-cultural context). Designing carbon schemes in smallholder agriculture systems require strong effort in strengthening and respecting **land tenure rights** and incorporating **farmer representation power** into the design of the scheme, as the increased profitability of land use can lead to displacement of vulnerable groups including women.
Furthermore, unpredictable price developments on unconsolidated carbon markets, including the VCM, can affect the long-term project sustainability. Consequently, this uncertainty must be considered within the project planning phase: e.g. by communicating risks for farmers (end of carbon scheme due to decreasing market prices) accordingly. The risk for participating farmers is limited. The only consequence of decreasing carbon prices for farmers is not getting agricultural advisory services anymore.

4. Our position

The implementing GIZ projects make the following recommendations on the establishment of carbon certification schemes and take the following positions:

I. Carbon certification schemes need to apply highest environmental quality standards possible

Carbon certification projects must be designed with the **highest quality of certification standard** possible for a project. Only internationally recognized certification standards are recommended to secure the project's integrity. A good indicator is the recognition of the International Social and Environmental Accreditation and Labelling Alliance (ISEAL) Codes of Good Practice in Standards-Setting[20]. To secure the **highest environmental integrity** of carbon projects in agriculture, a focus on agroforestry techniques and, as soon as certifiable, biochar application is recommended, since the permanence risks are lower compared to other land management practices. It is recommended to follow the most stringent non-permanence-risk buffer settings possible.

II. Carbon certification schemes need to apply highest social quality standards possible

Without social quality standards the project risks not meeting its development impact target or even harm target groups. The latter one may happen for example if farmers implementing sustainable farming techniques are not receiving the expected quality or quantity of compensation from the carbon project. To secure a **high social quality standard,** especially robust carbon rights and transparent, informed procedures for transferring carbon rights from landowners to a carbon scheme organizing entity are important. A continued adaptation of VCM standards and mechanisms to secure benefits for smallholder farmers in developing countries is essential for sustainable market participation. **GIZ may influence the applicability of certification standards for its target group,** since most of the methodologies of the standards are not specifically designed for developing countries.

[20] ISEAL

III. Work with creditable carbon certificate buyers to support corporate climate ambition

Major critic on the VCM is centred around the risk that offsets undermine corporate climate action. Projects can actively aim to work with carbon buyers, who have set ambitious science-based target[21] and follow recognized standards for disclosing greenhouse gas emissions, such as the greenhouse gas protocol or the carbon disclosure project. The ambition of a buyer should be first to avoid, then to reduce and only lastly to offset residual emissions. Carbon buyers should also be sensitized to set realistic claims. Rather than claiming carbon neutrality based on offsets, a temporary contribution to mitigation goals may be appropriate.

5. Experiences and recommended actions

Based on the experiences, the following recommendations for promotion of carbon certification schemes in smallholder agriculture can be given:

a) **Support scaling up carbon projects in agriculture and increasing MRV and governance efficiency.** Current approaches introducing SLM practices by carbon projects are new and available standards are still developing. Significant climate mitigation impact can only be reached with scaling activities to large areas. Full cost recovery models for channelling carbon funds into SLM activities run by small holders need to consider high transaction costs (e.g. MRV, governance of carbon schemes, advisory services). Thereby, increasing the efficiency of carbon schemes requires reduction of transaction costs, for example by applying satellite-based SOC monitoring or digital extension service support systems. To improve partner countries national climate MRV system efficiency it is recommended to link carbon projects MRV to national carbon registries.

b) **Upfront financing is key for project development.** Establishing collaboration with funding institutions helps to bear the upfront costs. Since the instrument carbon certification is new, common funding sources such as governments, multilateral and bilateral donors or development banks lack know how to incorporate carbon certification into their funding portfolio. It is recommended to enable public funding sources to leverage private funding. Planning projects within working value chains eases the launching of carbon certification projects in agriculture if compared to only work with smallholders. Identifying favourable project contexts, e.g. existing efficient extension service systems or well organised farmers, lower the need for initial investments.

c) **Activities targeting at increasing SOC in agricultural soils only work if they increase crop yields and food security**. The adoption of farming practices increasing SOC often leads to higher risk-adjusted yields and financial returns for smallholder farmers, alleviating poverty and promoting food security. Yield increase is the single most important incentive for smallholder farmers. According to our experiences and under current price levels, it is not favourable to disburse direct payments to farmers from carbon schemes, as costs for securing long term advisory services and MRV need to be covered. This might change with substantially rising carbon prices and increased efficiency of carbon projects. It is further recommended to combine (and measure) carbon benefits with water, biodiversity, health, or other co-benefits to achieve higher returns from certificate buyers and improve the outcomes for farmer families.

[21] Science Based Target Initiative

d) **Soil carbon enrichment must come from unused biomass such as crop residues and organic waste.** This is to avoid biomass withdrawals, resource conflicts, and degradation elsewhere. To make sufficient biomass for soil carbon build-up available and ensure food security, sustainable intensification among smallholder farmers with yield increase potential is to be promoted.

e) **Baseline values preceding a carbon certification project must be developed based on local conditions of soils.** Soils in semiarid to arid regions have for example naturally very low potential for carbon storage. Similarly, soils already in poor conditions are naturally not prone to loosing big quantities of carbon under any cultivation method. Larger losses of SOC are expected therefore from soils richer in SOC.

f) **Baseline scenarios for social factors must be developed preceding a carbon certification project.** Equally important for the project planning is the inclusion of all other local specifications such as the socio-economic situation and demographic distribution of the farmers, the landscape approach of the project area, and the agricultural management system. Thus, the effect on livelihoods of local farming families and potential for synergetic improvement needs to be monitored closely. It is also recommended to assure coherent communication on the use of carbon revenues to all stakeholders to prevent conflicts.

g) **Sustainable entity needed to organize the SOC certification scheme.** Carbon certification projects run 10-20 years. A coordinating entity needs to organize the market during this time horizon. The role of public decision makers is restricted to provide enabling conditions for carbon projects. The scoping (feasibility studies) and set-up of carbon projects (incl. enabling the coordination entity in MRV, agricultural advisory services, carbon marketing) is recommended to be undertaken by skilled project developers with specific know-how. A success factor to realize development impacts needs stakeholder management, advocating for an enabling environment, esp. improve the certification frameworks for developing countries, secure in-country mechanisms to benefit poor households, facilitate upfront financing, national policy development and enabling national carbon and SDG accounting to measure impacts.

6. Innovations: be smart, efficient, and pro-poor

If compared to similar carbon schemes, the GIZ Western Kenya carbon scheme pilots an innovative MRV system and benefit sharing mechanism. Using a modelling approach for activity monitoring instead of pure activity monitoring, monitoring costs of the scheme could be decreased significantly. Also, the pilot uses digital monitoring tools (app), which makes the MRV more efficient. The digitalized MRV system provides the potential to integrate commodity market platform access for smallholder farmers. The reinvestment of revenues from selling certificates into agricultural extension service systems provides a community benefit: Not only strong farming households, sequestering a lot of carbon, receive a benefit from carbon sequestration, but also weaker members of the farming community receive agricultural extension services.
GIZ implements a pilot on “Satellite-based digital solutions for the valorisation of climate-friendly agriculture” via the GIZ Fund for the Promotion of Innovation in Agriculture (i4Ag). The main objective is to assess carbon stored in the soil by using satellite-based monitoring approaches. The newly developed approach via remote sensing technology is tested to improve the efficiency of soil carbon monitoring.

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