Guidebook for Project developers

Best practice for Agricultural carbon project development targeting Voluntary Carbon Markets (VCM)

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Sector Project on Soil Protection,
Combating Desertification, Sustainable Land Management/
Secretariat of the CompensACTION Initiative
Friedrich-Ebert-Allee 32
53113 Bonn
Germany
Phone: +49 228 44 60-0

E ccd-projekt@giz.de / compensaction@giz.de
I www.giz.de / www.compensaction.com

Project description
Sector Project on Soil Protection, Combating Desertification, Sustainable Land Management
Secretariat of the CompensACTION Initiative

Authors
Dr. Timm Tennigkeit and Adaugo Okoli, unique land use GmbH, Schnewlinstr. 10 79098, Freiburg
Alexis Brakhan, Sector Project on Soil Protection, Combating Desertification, Sustainable Land Management

Design
Agnes Weegen Köln

Layout
Additiv. Visuelle Kommunikation, Berlin

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German Federal Ministry for Economic Cooperation and Development (BMZ)
Division 122 agriculture, rural development
RL122@BMZ.Bund.de

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CompensACTION for food security and a healthy planet

A CompensACTION Project

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List of Abbreviations

AFOLU Agriculture, Forestry and Other Land Use
ALM Agricultural Land Management
ARR Afforestation, Reforestation and Revegetation
CBOs Community Based Organisations
CCPs Core Carbon Principles
CDM Clean Development Mechanism
COP Conference of the Parties (of UNFCCC)
DFI Development Finance Institution
ERPA Emission Reduction Purchase Agreement
ESIA Environmental and Social Impact Assessment
GEF Global Environmental Facility
GHG Greenhouse Gas
GIS Geographic Information System
GIZ Gesellschaft für internationale Zusammenarbeit
ICVCM Integrity Council for the Voluntary Carbon Market
IGOs Intergovernmental Organisations
IP Implementing Partner
ITMO Internationally Transferred Mitigation Outcome
KFW Credit Institute for Reconstruction; a German Investment Bank
MR Monitoring Report
MRV Measurement, Reporting and Verification
NbS Nature-based Solution
NDC Nationally Determined Contribution
NGO Nongovernmental Organisation
PDD Project description document
REDD+ Reducing Emissions from Deforestation and forest Degradation (plus: sustainable management of forests, conservation of forests, and enhancement of forest carbon stocks)
SCCS Soil Carbon Certification Services
SHAMBA Small-holder Agriculture Monitoring and Baseline Assessment
SLM Sustainable Land Management
SOC Soil Organic Carbon
UNFCCC United Nations Framework Convention on Climate Change
VCM Voluntary Carbon Market
VCMI Voluntary Carbon Markets Integrity Initiative
VCS Verified Carbon Standard; administered by Verra
VCU Verified Carbon Unit
VVB Validation and Verification Body
WKCP Western Kenya Soil Carbon Project

1. Background and Scope

1.1. The Importance of Agricultural Carbon Projects

60% of food worldwide is produced by smallholder farmers in low to middle income countries. They usually farm less than 1-2 ha of land. Over time, increasing farming intensity and fragmentation of agricultural lands have led to nutrient depletion and degradation of agricultural lands in many parts of the world (World Bank, 2021). Land degradation combined with climate change threatens agricultural productivity and global food security. Smallholder farmers require technical expertise to adopt holistic farming practices such as Sustainable Land Management[1] (SLM), which **restore degraded lands and improve their resilience to climate change**. SLM practices also **mitigate climate change by increasing the sequestration of carbon in soil and biomass**. Furthermore, **by implementing holistic SLM practices, various public benefits can be achieved, such as increased biodiversity, diversified livelihoods, and healthier ecosystems**, which align with the policies supported by numerous countries.

1 SLM involves implementing sustainable agricultural practices, such as agroforestry, crop rotation, cover crops, improved tillage, and other practices that maintain or improve the health and quality of soil, water, and vegetation while promoting sustainable agricultural production.

The UNFCCC Paris Agreement reflects a collective global commitment to effectively address climate change and its impacts through mitigation and adaptation measures. Given the dimension of the task it explicitly states that climate finance needs to come from a variety of public and private sources. The voluntary carbon market thus complements compliance markets for emission reductions and allows firms and other institutions to compensate unavoidable emissions.

In line with the Paris Agreement, the 4 per 1000 initiative launched at UNFCCC COP21 sets a collaborative focus towards soil carbon sequestration for food security, climate change mitigation and adaptation. Globally, several initiatives, including the Special Initiative Transformation of Agricultural and Food Systems[2] have focused on promoting SLM practices, but public funding is insufficient and competition with various other crises is dramatically reducing public attention to ensure food security. Sufficient agricultural advisory services promoting SLM practices are therefore lacking in many countries due to a lack of funding. Payment for ecosystem services have been suggested to incentivize farmers to adopt environmentally friendly and sustainable practices (See Box 1).

2 Special Initiative Transformation of Agricultural and Food Systems | BMZ

Box 1: CompensACTION's Approach to Supporting Sustainable Agriculture

The initiative **CompensACTION** for food security and a healthy planet was launched in July 2022 under German G7 Presidency by the German Federal Ministry for Economic Cooperation and Development (BMZ) within the Food Security Working Group. Its vision is that agricultural producers worldwide, especially smallholders in developing countries, receive adequate compensation for their multifunctional services and thus earn a living income by selling their produce and by being paid for ecosystem services and for their contributions to climate adaptation along the entire agricultural value chain.

This requires compensation mechanisms that combine income from agricultural production with a payment for positive externalities. Such a smart income mix can provide smallholders with a living wage and contribute to both food security and climate protection. One of CompensACTION's goals is therefore to contribute to the diversification of financial instruments and thus leverage public and private funding for the preservation of ecosystem services.

The Voluntary Carbon Market (VCM) is a mechanism for mobilizing private investment through certified emission reductions. It is a market-based approach where greenhouse gas (GHG) emissions reductions or removals are measured, verified, and after 3rd party validation traded as carbon credits or cancelled to compensate emissions.

Buyers invest based on corporate voluntary commitments, e.g., under the Science-based target Initiative (SBTi) to reduce their GHG emissions that are not regulated or covered in the compliance market. The purchased carbon credits are used to offset emissions to claim carbon neutrality or other environmental claims e.g., as part of sustainability commitments. Thus, VCM allows the flow of private finance to nature-based climate solutions and can **address the long-term financing gap for SLM adoption and provide opportunities for low to middle income countries to diversify funding sources and increase investment in SLM.**

The VCM drives innovation and due to its currently unregulated nature, it is associated with less bureaucracy and lower transaction costs than regulated markets. However, with increasing scale and concerns about misuse, certification and reporting requirements have increased rapidly. The VCM and its projects are still not regulated in many countries and agreements between private sector participants are negotiated on an individual project basis. However, based on recent UNFCCC COP decisions on Paris Agreement Article 6, many countries currently develop policy frameworks and negotiate agreements with private sector participants on an individual project basis. Generally, VCM projects are expected to become more regulated in more countries, putting higher requirements on project developers.

Initially, the VCM was dominated by renewable energy projects, but since such projects have been increasingly commercially viable and it has become more difficult to demonstrate their additionality, NbS are the pre-dominant project type. Projects are often implemented by civil society together with specialised private service providers and cooperate investors. Projects directly engage local communities. In the case of agricultural carbon projects, projects support farmers to adopt SLM by financing agricultural extension services and monitor the climate impacts in compliance with certification standards. Due to the high implementation demands, one of the limitations identified to scaling agricultural carbon projects includes a shortage of experienced project developers who are well equipped to mitigate and manage the project risks. Therefore, this guidebook aims to inform the design of agricultural carbon projects and to support project developers in navigating key project development issues, drawing on lessons learnt from a pilot project; the Western Kenya Soil Carbon Project (WKCP) as well as feasibility studies in India and Madagascar.

1.2. Scope of this guidebook

Project developers can make use of this guidebook to understand how to engage the voluntary carbon market, to incentivise SLM activities and learn how to develop agricultural carbon projects contributing to food security and multiple other livelihoods and ecosystem services. The specific focus is on cropland management including agroforestry.

In contrast to other guidelines, this guidebook takes a practical perspective, aiming to operationalise existing guidance specifically for smallholder projects. Thus, it complements the guidance provided by voluntary carbon standards, the ICVCM, and VCMI. The guidebook is structured according to the following key project design features. In each section, best practice examples and recommendations are given. These mainly draw from the WKCP but also include learnings from project feasibility studies done in India and Madagascar:

- Best practices for meeting general carbon project requirements
- Roadmap for project development
- Governance and management
- Agricultural advisory services delivery
- Measurement, Reporting and Verification (MRV)
- Financial overview over expected expenditures and revenues

Although value chain carbon insetting[3] for corporate accounting requires several similar tasks, this guidebook focuses on carbon crediting projects only.

3 Carbon insetting refers to reducing emissions within a company's own operations or supply chains, while carbon offsetting refers to investing in projects that are not related to a company's operations.

2. Introduction to Agricultural Carbon Projects

2.1. Trends and Drivers of Voluntary Carbon Markets

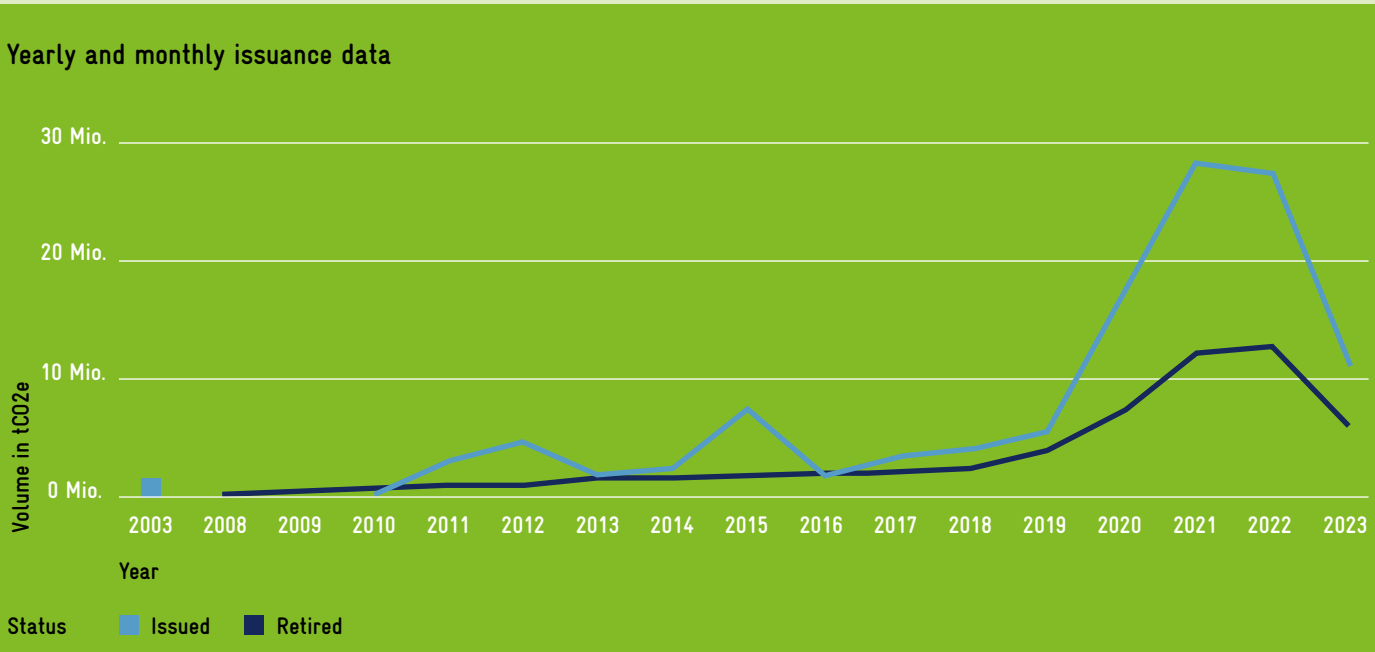
Carbon markets have experienced extraordinary growth between 2019-2021. The transacted volume of NbS carbon credits increased from 5 million in 2019 to 28 million in 2021 (Climate Focus, 2023). Since 2021, markets remain on a plateau reflecting economic stagnation due to the COVID-19 pandemic and the recent criticism on VCM projects, e.g. overestimated avoided emissions related to counterfactual baselines of REDD+ projects (World Bank: State and Trends of Carbon Pricing 2023).

In the VCM, NbS accounted for more than a third of total credit issuances in 2021, surpassing those of the energy sector by 46% (Wollenberg et al. 2022). Projects to sequester carbon though afforestation, carbon sequestration in agriculture, and improved forest management contributed to a fifth of this growth (World Bank: State and Trends of Carbon Pricing 2022).

The majority of NbS investments however still target forestry-related projects. In 2021, only 1% of the carbon credits issued by the four largest carbon standards American Carbon Registry (ACR), Climate Action Reserve (CAR), Gold Standard (GS), and Verified Carbon Standard (VCS), of the VCM went to the funding of agricultural activities, compared with 42% for forestry and other land use projects (So et al. 2023). The share of agriculture in all AFOLU carbon projects is still small, but some market growth is visible when comparing the numbers of 2021 (less than 1% of all credits) with the ones from 2022 (1.3% of all credits). Wide-spread adoption and scalability of agricultural carbon markets is still limited by several challenges, including those described in the next section 1.5.

While the growth in NbS volume is simple to track, based on the information available in the standard specific carbon registries, the price development is less transparent due to many over-the-counter transactions based on individual negotiations between buyer and seller. The price range for agricultural carbon projects increased since 2019, from about USD 4 to USD 10-15 USD for long-term future contracts in developing countries. The price for spot market agricultural carbon credits is considerably higher, ranging from USD 20-30 per credit

Figure 1: Voluntary carbon market credits issued/retired from 2003 until 05/2023



Source https://climatefocus.com/initiatives/voluntary-carbon-market-dashboard/

(Unique land use, 2023[4]). Due to the significant co-benefits of agricultural carbon projects, investors are willing to pay significantly higher prices for these credits than for other NbS project types.

Growth in the VCM is largely due to a rapid acceleration of corporate carbon neutrality and net zero commitments, bolstered by new industry initiatives like the Taskforce on Scaling Voluntary Carbon Markets. Corporate buyers, due to a high aversion to reputational risk are increasingly cautious about the quality of carbon credits. A Long-Term Carbon Offsets Outlook report by BloombergNEF found that the offset market failed to grow in 2022 with companies buying 4% less offsets than 2021. This may potentially stem from the surrounding media and investor criticism of offsetting as an effective climate solution. In response, many governments are beginning to regulate the environmental claims permissible for companies. Notably, the recently introduced EU Green Claims directive imposes limitations on net zero claims by companies operating in the European Union, permitting only those supported by robust and verifiable data. Future growth of the VCM may therefore be hinged on the application of more rigorous definitions of quality, and greater emphasis on carbon removal to solidify market confidence, lift prices and drive demand. Reports (BCG and Shell, 2022) predict continued, long-term increase in the value of the voluntary carbon market, reaching 10-40 billion by 2030.

Corporate demand for carbon neutrality solutions is also behind a growing trend towards so-called 'insetting' where companies meet their net zero targets by investing in projects/interventions that decarbonise their own agricultural value chains. Such initiatives currently represent only a small share of NbS projects but can be expected to increase in the next few years. Insetting is following the Science Based Target Initiative FLAG guidance[5] and the GHG Protocol *Land Sector and Removals Guidance*[6].

2.2. ProSoil projects in Kenya, India, and Madagascar

The GIZ **Soil Protection and Rehabilitation of Degraded Soil for Food Security (ProSoil)** programme promotes sustainable land use by supporting smallholder access to advisory on agroecological practices. The practices help in building up organic matter (humus), as well as in enhancing fertility and the soil's capacity to absorb water. The immediate advantage is rising yields which improve the food situation of smallholders and open up new sources of income. The programme is financed by BMZ's Special Initiative Transformation of Agricultural and Food Systems and works in coordination with the relevant ministries in seven partner countries. GIZ Sector Programme Soil Protection, Desertification and Sustainable Land Management (SV BoDeN) supports ProSoil in implementing climate smart soil management approaches and accessing voluntary carbon markets to ensure long-term financing and permanence of SLM practices after the programme duration runs out. This guidebook draws upon key lessons from ProSoil's carbon project development activities in **India, Madagascar and Kenya.**

In **India**, the ProSoil project since 2015 has been supporting a suite of activities focusing on efficient water management, soil fertility management, soil protection and water conservation, common property resource management and rehabilitation of land, crop management, and localized quality agro-meteorological advisories to farmers in the states of Maharashtra and Madhya Pradesh. The total project area is 53,000 ha. The project is in the implementing phase, developing the carbon project description document and identifying prefinancing to cover the project development costs.

ProSoil is being implemented since 2018 by partner non-governmental organizations (NGOs) in the Boeny region of Northwest **Madagascar**. The project activities comprise residue management, fruit tree cultivation, improved fallow, crop rotation, amongst other erosion control and SLM practices. The project intends to reach a total area of 38,000 ha by 2026.

The ProSoil project in **Kenya** has now transitioned into the Western Kenya Soil Carbon Project (WKCP). It is the first agricultural carbon project actively testing the option to ensure sustainable long-term financing for a SLM development project through the VCM. WKCP therefore acts as a pilot for the other country packages.

4 Prices based on current market knowledge at document creation. Subject to dynamic market changes, prices may vary. Consult updated sources for latest information.

5 https://sciencebasedtargets.org/resources/files/SBTiFLAGGuidance.pdf

6 https://ghgprotocol.org/land-sector-and-removals-guidance

Box 2: The Western Kenya Soil Carbon Project

The WKCP was developed using the Verra VCS standard and is aiming to reach an initial scale of 11,000 ha and a scale of 32,000 ha once it is fully rolled out. A local not-for-profit entity, Soil-Carbon Certification Services (SCCS), was established to meet the carbon monitoring requirements and to coordinate investors (carbon certification buyers) and project implementers (extension service system). The extension service system was initially set up by GIZ in the ProSoil context. Welthungerhilfe, a German NGO, and six local community-based organizations (CBOs) are the project implementers. They will receive the carbon revenues from SCCS on a performance basis to provide agricultural advisory services for up to 30 years.

Carbon revenues are not paid directly to the farmers but will finance the agricultural extension services and some agricultural inputs. Before the project was established, agricultural advisory services were not readily available and, if provided at all, only ad-hoc for a short period by development projects. Subsistence farming is the dominant farming system in the project region, characterized by low inputs, low yields, and rapid loss of soil fertility due to increasing land fragmentation and overutilisation of soil nutrients. These practices led to long-term degradation and loss of land productivity, as well as reduced food and income security.

By participating in the WKCP, the farmer families can get access to bi-annual agricultural advisory services for 30 years at no cost. About 60.000 farmer families (each with Ø 5 members per household) are targeted to participate in the carbon project and profit from these services. Through the introduced SLM measures, farmers in the project can achieve ca. 30% higher yields. Further benefits for farmers are that they diversify their income streams through assisted farm development and reduce their dependency on artificial fertilizers, which are often not affordable. On average, the income of a farmer's family implementing the project's SLM, increased from ca. 1,000 to 1,500 USD/year, if compared to conventional farming practices. With the formation of registered famer groups, participating farmers are now eligible to access loans from microfinance institutions. This bundle of benefits reduces the risk that farmers revert to baseline practices which release soil carbon back to the atmosphere.

In addition, the digital data collection and processing offers the potential to improve agricultural advisory services by providing market access and benchmarking with other farmers. 60% of the participating farms are women-led farms so that women benefit particularly from the project.

2.3. Challenges of Agricultural Carbon Projects

- **High entry costs and initial project costs:** Implementing carbon market mechanisms require substantial upfront investments in data collection, monitoring systems, capacity building, and infrastructure. These transaction costs are especially high when working with a high number of farmers who each cultivate only small areas of land. Enabling framework conditions for investments for agricultural carbon projects are required (e.g., predictable public approval or taxation policies and processes), including capacity development and access to pre-finance (e.g., revolving fund), to reduce the project development and market entry barriers.

- **Low credit prices:** Project developers need to recover their costs and generate profits to sustain their operations and attract investments into SLM. Until recently, low prices in the VCM - widely attributed to an oversupply of credits with quality concerns and older vintages - discouraged project development. Initiatives such as the Integrity Council for the Voluntary Carbon Market (ICVCM) and the Voluntary Carbon Market Integrity Initiative (VCMI) introduce additional quality criteria to support quality-based market and price differentiation, and build market confidence.

- **Certification / Market complexity:** The expertise required to develop agricultural carbon projects e.g., baseline development, setting up monitoring systems, and conducting third-party audits is a significant entry barrier. There is a need for digital solutions to simplify the required project development procedures and knowledge sharing of best practices to support project developers. Furthermore, markets are not very transparent, and buyers/investors are only interested in large volumes to benefit from economy of scale related to transaction and monitoring costs.

- **Measurement and monitoring:** One of the key challenges in agricultural carbon projects is accurately measuring and monitoring carbon emissions and removals. This is especially true for smallholder projects, as setting up and applying existing methodologies can be laborious and not always cost-effective. Moreover, existing measurement and monitoring methodologies are frequently subject to scrutiny, necessitating regular revisions and updates across established standards.

- **High reversal (non-permanence) risk:** Considering the long project period of 30-40 years, farmers could return to unsustainable management practices due to insufficient incentives or access to agricultural advisory services. Therefore, it is crucial that carbon benefits are aligned with the adoption and continuation of sustainable agricultural land management practices.

- **Policy uncertainty:** There is still considerable regulatory uncertainty surrounding the future of VCMs. Article 6 of the Paris Agreement has set the need for individual countries to decide on the national role of the voluntary carbon market and if corresponding adjustments will be applied to deduct emissions reductions from the national GHG inventory when exported as internationally Transferred Mitigation Outcomes (ITMOs)[7] or under Article 6.4. To avoid such risks, developers could prioritise countries where governments provide an enabling investment environment.

7 Internationally Transferred Mitigation Outcomes (ITMO) are units from the new mechanism for the international emissions trading between Parties to the Paris Agreement. General rules in this regard are stipulated in Article 6(2) of the Paris Agreement but details for this mechanism are to be established yet.

3. Essentials for Carbon Project Development

3.1. Understanding Guidelines and Requirements

Projects aiming to generate verified GHG benefits for voluntary offsetting purposes must comply to three levels of requirements. These include the general principles of offsetting, exemplified by the Core Carbon Principles (CCPs), requirements of the standard & methodology under which the project seeks to be registered, and the regulations of the host country where the project is located. These are discussed in further detail below.

8 For the comprehensive list of CCPs, see https://icvcm.org/the-core-carbon-principles/

Core Carbon Principles

Core Carbon Principles (CCPs), established by the ICVCM, are a set of quality criteria widely agreed upon by stakeholders in the carbon market and enshrined in the program rules of most carbon credit standards. These criteria are based on scientific principles and best practices, which aim to ensure integrity in carbon credits and the idea of carbon off-setting. The CCPs set a global benchmark for assessing the emissions impact, governance, and sustainable development contribution of carbon crediting programs. The guiding principles concerning emissions impact[8] are outlined below, along with best practice steps for project alignment, highlighting practical examples from the WKCP.

Table 1: CCPs and Best practice for alignment

Principle	Definition	Best practice	WKCP-context
Additionality	Emission reductions or removals claimed by the project would not have occurred in the absence of the incentive created by carbon credit revenues.	In practice, additionality is assessed by using standard-approved methodological tools to identify key barriers that would prevent the implementation of project activities which deliver GHG emission reductions. This can be combined with an investment analysis comparing the economics of alternative land uses with the project activity without carbon credits. The extent to which proposed project activity has already diffused in the geographical area is also assessed in a 'common practice analysis'	The baseline farming system is typically low-input smallholder subsistence, with a low level of application of good agricultural practices. This is due to a combination of factors including limited information and access to new technologies, a weak agricultural extension system, and the low financial capacities of the smallholders. The analyses show that the project activity is not the baseline scenario, hence, it is additional. Common practice analysis showed, that advisory services for smallholder farmers are only available ad-hoc or depending on availability of funds, and with limited long-term impact.
Permanence	The GHG emission reductions or removals from the mitigation activity shall be permanent or, where there is a risk of reversal, there shall be measures in place to address those risks	Standards require to ensure permanence over a period of minimum 30 up to 100 years. A non-permanence risk assessment is usually done to identify	Smallholder agricultural projects pose the risk of farmers returning to unsustainable management practices during or after the certification period. To mitigate this, WKCP provides long-term extension service to

continuation

Principle	Definition	Best practice	WKCP-context
Permanence *continuation*	and compensate reversals.	the main project risks and mitigation measures. Based on this, a certain percentage of GHG emis-sion reductions or removals are deducted from the total credits issued and allocated to the buffer pool.	farmers to encourage permanent adoption. Strengthening farmer organizations will ensure access to information and markets. A non-permanence risk buffer of 12% is deducted from the project's total credits. Additionally, 30% of the credits are set aside by SCCS, to be released gradually along the bi-annual verification of the project impacts.
Robust quantification of emission reductions and removals	The GHG emission reductions or removals from the mitigation activity shall be robustly quantified, based on conservative approaches, completeness, and scientific methods. This means that uncertainty in all GHG estimations and/or measurements made by the project should be quantified to a reasonable degree and where necessary, deductions made in total GHG benefits to account for uncertainties.	Projects follow approved methods from the major standards which provide guidelines to estimate and monitor carbon benefits. Uncertainty in data inputs, equations and measurements are estimated and deducted from final GHG estimate to ensure conservatism.	WKCP uses an efficient MRV system and estimates GHG benefits via methods approved by the VCS.
Avoiding Double counting	The GHG emission reductions or removals from the mitigation activity shall not be double counted, i.e., they shall only be counted once towards achieving mitigation targets or goals. Double counting covers double issuance, double claiming, and double use.	Project proves that it is not registered to other emis-sion trading schemes or GHG programs including compliance markets.	WKCP is endorsed at county level and recognized at national level. Furthermore, Kenya is in the process to update the climate change bill, which will require that VCM projects are registered to prevent any potential overlap that may threaten the integrity of the project and Kenya as a host of quality VCM projects.
Avoiding leakage	Leakage refers to the unintended increase in emissions that occur outside the project boundaries when efforts to reduce emissions in one location displace emissions to another location. Such leakage must be adequately monitored and measured by each project.	Project identifies probable emission leakage sources based on the project con-text and develops mitigation actions for them. During implementation, these sources are monitored, and any occurring leakage is measured per standard-stipulated meth-ods and deducted from the final emission reduction estimates.	Leakage of fuel wood consumption from the project area is considered and mitigated by integrating an improved cookstove component into the project.

The ICVCM has introduced two assessment frameworks[9] for CCPs at the program and category levels. The **program-level framework** evaluates which carbon standards (programs) are eligible for CCP approval. This helps investors identify well-governed standards to align with and project developers select appropriate standards for their projects. The **category-level Assessment Framework**, facilitates the evaluation of credit types such as ARR or improved cropland management.

From July 2023, standards can now apply to be assessed as CCP-eligible. If programs and categories meet the criteria laid out in the frameworks, they will receive the CCP-approved label.

9 https://icvcm.org/assessment-framework/

Table 2: Methodologies of the 3 major VCM standards applicable to smallholder cropland activities

Methodology	Standard	Project Type	Eligible Activities	Pros & Cons for project development
VM0042 - Improved Agricultural Land Management, v2.0	VCS	ALM	Reductions in fertilizer application and tillage, improvements in water management, residue management, cover crop planting and harvest, grazing practices and others.	**Pro:** Allows a broad range of project activities. The methodological features from the inactivated VM0017 can be integrated (see Box 3) More rigorous / accurate quantification approach involving the periodic validation of modelling results through use of direct measurements. **Con:** Increased monitoring costs related to direct measurement requirements
Soil organic carbon activity module: increasing soil carbon through improved tillage practices	Gold standard	ALM	Changing soil tillage practices from conventional	**Pro:** Applicable to smallholder farms Considers soil carbon stocks. **Con:** Narrow activity scope (only tillage practice
Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation	Gold Standard	ALM	Reduced anaerobic decomposition of organic matter in rice cropping soils.	**Pro:** Applicable to smallholder farms **Con:** Narrow activity and emissions scope (only methane from rice cultivation practices is considered)

continuation

Methodology	Standard	Project Type	Eligible Activities	Pros & Cons for project development
Smallholder Agriculture Monitoring and Baseline Assessment (SHAMBA) Tool	Plan Vivo	ALM	Tree planting, agroforestry, and agricultural interventions that increase organic inputs to soils and/or reduce burning of fields and agricultural residues.	**Pro:** Based on modelling, which is more cost-effective than field measurements and feasible for smallholders **Con:** Quality concerns related to lack of project-specific additionality assessment
Smallholder dairy	Gold Standard	Dairy	Reduced emissions from intensified dairy production operations, specifically from cattle and buffaloes in a defined geographical region (i.e., project region).	**Pro:** Based on modelling, which is more cost-effective than field measurements and feasible for smallholders **Con:** Narrow scope of project activities (only dairy production operations)
AR-AMS0007 - Afforestation and reforestation project activities implemented on lands other than wetlands --- Version 3.1	CDM	ARR	Small-scale ARR activities, including agroforestry	**Pro:** Applica applicable for smallholder farms **Con:** only quantifies above ground (woody) biomass carbon stocks Planned to be replaced by Verra
Afforestation/Reforestation GHG Emissions Reduction and Sequestration v1.0	Gold Standard	ARR	All A/R activities excluding wetlands	**Pro:** applicable for smallholder farms **Con:** only quantifies above ground (woody) biomass carbon stocks
(Under development) Afforestation, Reforestation and Revegetation Projects	VCS	ARR	All afforestation, reforestation, and revegetation activities (excluding on organic soils or wetlands). This will replace AR-AMS0007.	**Pro:** applicable for smallholder farms **Con:** only quantifies above ground (woody) biomass carbon stocks

Certification Standards and Accounting Methodologies

An increasing number of standards and methodologies are being developed for different agricultural VCM project types. The three major independent certification standards are highlighted below.

The VERRA Verified Carbon Standard (VCS) is to-date the dominant carbon standard, issuing the majority of all carbon credits. It has been considered the most appropriate and globally recognized for agricultural land management activities. VCS allows a broad range of eligible agricultural practices to be certified, including agroforestry, improved cropland management, improved grazing, and biochar utilization. A new methodology for rice methane emissions is currently being developed.

Gold Standard rarely certifies projects in the agricultural sector, but related methodologies for zero-tillage and smallholder dairy exist.

Plan Vivo is focussing on small-scale community projects and the least robust quantification approach but stimulates innovation. Agricultural projects are focusing on agroforestry and a handful of improved land management projects.

Thee standard programmes establish methodological frameworks for quantifying the GHG benefits of different project types. Projects must then meet the conditions of the chosen methodology which vary in the intensity of data collection efforts and quantification steps needed. The methodology applied for a given project is usually determined by the applicability conditions and the data and quantification requirements. An overview of available methodologies is outlined below.

As seen in table 2, methodologies which can estimate carbon removals in soil from a wide range of cropland practices are few. Gold standard methodologies cater only to zero-tillage and dairy project types while those involving other SLM activities may use VM0042 or SHAMBA (if the latter's quality concerns are sufficiently addressed) to account for SOC stock changes. Prior to its inactivation in March 2023, VM0017 was the most widely used for SLM projects. While VM0017 adopts a pure modelling approach to GHG quantification, VM0042 mandates soil carbon measurements either as a stand-alone approach or to validate modelling results. This is expected to increase the project development costs, as soil carbon measurement would require intensive stratification and intensive field sampling efforts to capture the variability in SOC stocks.

Currently, six projects in Africa are being developed using the VM0042 methodology, but none has been validated yet (Verra 2023[10]). Meanwhile, standards have expressed keenness to make methodologies more usable for smallholder contexts. Stakeholders can participate in public consultation processes to give input on respective methodologies or even lead the development of new methodologies through laid-out processes[11,12]. However, this is a costly venture which requires high level of expertise and can take several years. Since these efforts constitute an important public good, they require public or philanthropic support.

Host Country Regulations

Carbon projects must comply with legal and regulatory requirements of the host country. This includes obtaining approvals from national or sub-national authorities regulating land use activities and following guidelines where they exist. Recently countries have started to develop regulations for the VCM in line with the guidance related to Article 6.4 of the Paris agreement. To assess the political risk, project proponents should identify the following national framework conditions:

- **Project Approval and issuance of corresponding adjustments:** Some countries have prerequisites for authorising VCM projects and the transfer of ITMOs. Project approval may require the preparation of technical proposals or screening studies which add costs and time to the projects budget. Alternatively, countries may authorise only a fraction of credits to the proponent and keep the rest to meet their own NDCs e.g., Zimbabwe. As more countries start to implement Article 6.4-related measures, the use of unauthorised credits (without corresponding adjustments) for offsetting may become riskier for investors. Where corresponding adjustments are unobtainable or difficult to obtain, the use of contribution claims[13] has also been proposed.

10 https://registry.verra.org/app/search/VCS/All%20Projects

11 VCS (2023) Methodology Development and Review Process, v4.2

12 Gold Standard (2023) Draft – Methodology Development, Revisions, And Clarification Procedure V2.0

13 A contribution claim as the name suggests is a claim that a project has contributed towards a certain amount of emission reduction/removals in a host country to support progress towards the country's NDCs. It has been proposed as a mechanism to allow project proponents claim credits for which the host country will not apply a corresponding adjustment.

Box 3: How can VM0042 be feasible in smallholder-based agricultural carbon projects?

The VERRA VCS VM0042 sets one of the highest standards in carbon accounting of soil-derived carbon credits. The methodology with its data and modelling requirements is primarily targeting large-scale precision farming where direct soil measurements either exist already or taken to improve soil fertility management. Below the application of VM0042 for smallholder agriculture based on the features developed within the inactivated VM0017 is presented.

- **Ensure increase in climate risk adjusted crop yields:** Enhancing or at least maintaining climate risk adjusted crop yield is the basis for smallholders' livelihoods and conditional to apply VM0042. Any sustained reduction of crop yields of more than 5% renders the project ineligible for VCS carbon certification.

- **Use quantification approach 1:** Smallholder-based agriculture is typically facing high variability in soil carbon stocks. Therefore, modelling is preferred over measuring soil carbon stock changes. VM0042 offers the quantification approach 1 "Model and Measure". This option still requires periodic soil measurements but at least reduces the measurement intensity and related costs. Importantly, such soil carbon inventories should commence before the project activity has been implemented to show effects on soil carbon stocks.

- **Model validation study:** VM0042 mandates users to validate the desired model. Models such as RothC, which have been successfully applied in smallholder based VM0017 projects, need to undergo a scientific exercise to prove that model results are replicable and applicable in the scope (climate or nationally defined agricultural land regions, soil types, practices) of the carbon project. Project developers must conduct such a study unless it is publicly available. It is central to this study that developers first define „crop functional groups (CFGs)" (such as "maize-bean rotation") within a certain „practice category" (e.g., application of organic amendments) to be promoted in the project. The model must be validated to give accurate results for each CFG. For this, peer-reviewed and publicly available datasets must be used. These data sets may be difficult to obtain from data-poor environments. Other data sets closest to the specific scope may be used though. The actual resource needs for such a study are still unknown.

- **Regular soil carbon measurements:** Soil carbon measurements in the „Model and measure" approach of VM0042 are required for the „true-up" of the model. Regular soil carbon inventories using stratified random sampling should be conducted every 5 years covering all CFGs validated in the model validation study. The data from these inventories is used to update the results of the model validation study. Considering that there are around 10 CFGs in a smallholder carbon project, one sample field per CFG is necessary. With a medium variance in organic carbon content, each field may require around 20 samples. Thus, costs per soil inventory can be expected to be up to 20,000 USD. The trued-up model then needs to re-quantify all emission reductions issued in past monitoring periods. This creates a risk, that in case of underperformance the issuance of new carbon credits in the future is reduced.

- **Construct a historical look-back period:** Each sample unit, such as a field, a farm, or even a region must provide information on the baseline schedule of activities (rotations) dating back 3 years. Typically, smallholders don't have a written crop-rotation schedule of even information on fertilizer application or similar. Thus, proponents will have to consult independent agricultural experts or government agricultural extension agents early-on in the project to provide the information.

Through this approach, the methodology still integrates some smallholder-friendly features from the inactivated VM0017. However, since direct SOC measurements are required in addition, monitoring costs will increase.

- **Legislation on carbon rights:** National legislation dictating carbon rights ownership also influence how such rights may be transferred to the project proponent. Some countries view carbon stocks as a natural resource owned by the state. In this case project proponents may require a license from the state to conduct the project e.g., in Mozambique. Laws may be sector-specific, e.g., in Madagascar, the state has exclusive rights to trade carbon credits from forests while carbon ownership from other land use sectors remains unregulated and typically follow land tenure, necessitating a legal agreement with landowners to transfer carbon ownership.

Box 4: VCM regulation – Experiences from Kenya and India

Many countries where the VCM operates are still in the process of developing well-defined regulatory frameworks for the VCM. India for example which is an attractive location for projects due to its large land area and agricultural potential remains without established regulatory frameworks for voluntary carbon projects. This leads to uncertainty for communities, project developer and investor.

A Central Accounting and Reporting Platform (CARP) has been agreed at COP27 including registries, databases, and guidance on re-porting. International guidance is expected to be available at the end of 2025. However, GIZ already started in 2022 to support countries like Kenya to strengthen existing soil management and carbon policies and capacity development among government staff and project developer, which is required to comply with interna-tional requirements.

The Kenyan State Department for Crop Development, Climate-Change Unit togeth-er with the multi-stakeholder climate-smart agriculture platform identified the follow-ing needs and functions of a soil-carbon registry:

- Reporting to UNFCCC (NDC, Fourth National Communication, biennial update reports)
- Reporting to UNCCD
- Input to the National GHG inventory (component 1 of the integrated MRV system1)
- Tracking mitigation actions (component 2 of the integrated MRV system)
- Tracking climate finance flow for mitigation actions (component 4 of the integrated MRV system)
- Quality enhancement for Voluntary Carbon Market projects

The draft Climate Change Monitoring, Reporting and Verification Regulation (MoEF, 2021) including reporting templates and the CSA M&E framework provides the reg-ulatory framework (MoALFC, 2022), but data input from government and devel-opment partner projects is still lacking. Therefore, a carbon registry[14] was designed to integrate existing information from projects including VCM projects based on guidance from the multi-stakeholder climate-smart agriculture platform. Initially, the registry was developed in MS Excel considering the available information provided by the VCM standards and in the PDDs. Options to integrate the registry into na-tional/county level integrated management information system (NIMES/CIMES) host-ed by the State Department for Planning through the Monitoring and Evaluation Directorate are explored.

Based on these developments, Kenya in May 2023 proposed an amendment to the central piece of national climate change legislation, the 2016 Climate Change Act. This Bill seeks to formally institute Kenya's national carbon registry. It also proposes carbon revenue taxes and mandatory community agreements through which a certain percentage of all carbon revenues are distributed as benefits to local communities.

Generally, such policy development is welcome considering the need for clear pol-icies to reduce Article 6-related risks for project developers, and at the same time maximise the local benefits of carbon projects. However, there is a risk that coun-tries, eager to benefit from carbon revenues, could unintentionally discourage in-vestment in sustainable development by imposing excessive costs and limitations on project developers. Especially if host-country requirements are more burdensome or duplicative of what is already mandated by VCM standards.

sTo navigate this developing landscape, project proponents should familiarize themselves with the regulatory framework of the respective countries. This includes consulting with local legal experts where necessary. Project developers may also engage in policy processes whenever possible to contribute to the development of a conducive environment for project development.

14 Kenya Soil Carbon Registry: Guidance for Initial Action, 2023. Report produced by GIZ with input from Unique land use for Kenyan Ministry of Agriculture and Livestock Development, Climate Change Unit.

- **Taxes, fees, and national revenue sharing laws:** Host countries may charge project approval fees, and/or tax a percentage of carbon credits issued. Tax laws may differ between sectors and organization types e.g., Community-led projects in Mozambique receive lower tax rates than private proponents. Proponents may also be required by national law to distribute defined percentages of the carbon revenue to local communities where projects are implemented. Project developers must take account of such laws as they may be significant to the project's financial model.

- **Land tenure regulations.** Since projects last for 20-30 years on average, long term security of land management rights is needed to guarantee permanence. Projects should therefore understand local land tenure laws and ensure that project activities are secure.

- Apart from the above, other national policies may inadvertently affect the development of carbon projects. For example, India's 2023 Finance Bill which regulates foreign finance to India may create bottlenecks for channelling finance from international investors towards project development in the country.

3.2. Project Development Roadmap

Developing a carbon project is a multi-step process led by the project developer and requiring input from various technical experts. A typical project development roadmap is shown in Figure 2 and described in detail below. Activities depicted by green boxes are those usually outsourced to external experts. It is recommended that project developers assess capacities and experience and seek expertise required at each stage of project development.

Developing a carbon project is a multi-step process led by the project developer and requiring input from various technical experts. A typical project development roadmap is shown in Figure 2 and described in detail below. Activities depicted by green boxes are those usually outsourced to external experts. It is recommended that project developers assess capacities and experience and seek expertise required at each stage of project development.

- **Project proposal.** When a project opportunity is identified, a proposal is drawn up defining fundamental information such as the proposed project area, SLM practices to be promoted, and outlining an appropriate

Figure 2: Project development roadmap

Source Adapted from Unique land use 2020. Blue boxes indicate activities typically completed by the project developer, while green boxes indicate steps typically carried out by a specialist / technical consultant.

agricultural advisory system and the governance structure of the project. At this stage, social and environmental project risks are also highlighted, and respective safeguards proposed. Preliminary estimates of project cost and carbon revenues may also be developed with the proposal.

- **Project assessment.** A carbon consultant usually supports this process by screening the eligibility of the project activities against available carbon methodologies and standard requirements. At this stage, any methodology modification requirements and related costs are outlined. A first estimate of the project GHG benefits is conducted. Project design features are defined, considering potential risks and challenges. Project costs and carbon revenues are estimated to assess the feasibility of the project. Project implementation financing options are also assessed. It is recommended to split this stage into a high-level scoping and a detailed assessment process, while the former is less detailed and cost intensive and serves to justify the investment in the latter.

- **Contracting.** Assuming the project assessment is promising, an investor should be identified, and a contract concluded to finance the project. Such a contract may be in form of an Emission Reduction Purchase Agreement (ERPA), depending on the type of funding received. Various types of investors are contrasted in Section 3.5.2. This process may also be supported by a consultant with relevant market knowledge.

- **Environmental and/or Social Impact Assessment (ESIA).** Depending on the national requirements an ESIA might be commissioned to request a project license from the relevant national authority.

- **Farm registration and carbon rights transfer.** Participating farmer are either already organized in groups or should form registered groups to ensure efficient interactions. For the certification the farm area must be mapped and in a free, prior, informed, consent (FPIC) process, an agreement on the carbon rights transfer in return for pre-defined benefits must be reached and documented. Digital tools, including Apps and a dashboard linked to a cloud database are key components of a Management Information System to facilitate this process.

- **Project description document (PDD) development.** Involves GIS analysis including land use, land use change analysis to define the project operational boundaries. Carbon baseline scenarios are also established descriptively and quantified for project activities. Additionality study and non-permanence risk assessments are conducted, and a suitable monitoring plan is developed. The results are compiled into the final PDD for validation.

- **Validation.** At this stage, an accredited auditor is identified and contracted to validate the project concept by auditing the project on basis of the PDD and the applied methodology. A consultant may also support and facilitate readiness for the validation process.

Box 5: Dealing with overlapping project boundaries.

Defining the project boundaries is one of the first steps of PDD development. The boundary of a carbon project delineates the project area where all carbon stock changes are monitored and accounted for.

For grouped projects, the grouped project boundary defines the outer boundary. In each instance additional project areas within the grouped project area can be included. Various methodologies define in their applicability conditions, specific land use types which must be excluded from the project area boundary e.g., wetlands or areas with recent land use change. SLM projects are usually restricted to cropland or grasslands. Methodologies also determine which carbon pools may be included in the project boundaries, based on project activities.

When multiple project proponents are active in the same region, new projects should ensure that farms already included in another carbon project's area are not included to avoid double counting of GHG impacts. This precautionary measure can be taken during the farm registration and carbon rights transfer process. A carbon registry operated by the host government is also expected to prevent double counting in the future.

■ **Implementation, Monitoring** and **Verification** are ongoing activities which continue beyond the project validation and throughout the crediting period. The same is also true for the process of **marketing and selling carbon credits**. Therefore, they are addressed in the subsequent section on 'project operations.'

3.3.. Project operations

Project operations are those ongoing processes which are necessary to keep the project functioning after the project is established and validated.

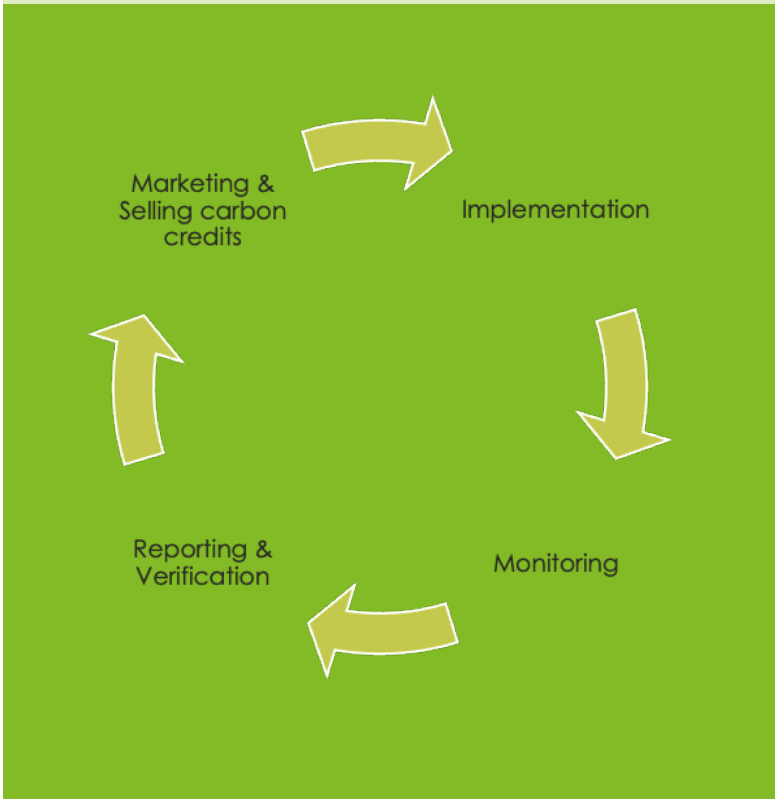
1. Implementation: Continuation of SLM practices promoted by the project. These are carried out primarily by landowners with support from agricultural advisory service provider.

2. Monitoring: The processes by which GHG benefits and other project impacts such as crop yield, reduced hunger and other livelihoods benefits are determined and quantified by the project. Monitoring is usually an annual process which involves data collection through field measurements, farmer surveys, or satellite data collection.

3. Reporting and verification: The monitoring data is compiled in a monitoring report (MR). This report is then verified by an external auditor who confirms the reliability of the report against provisions given by the carbon standard. This is a prerequisite for the issuance of carbon credits. Reporting and verification are carried out at longer intervals (2-5 years) balancing the event specific costs and the issuance and sale of the carbon credits to ensure project liquidity. Emission reductions/removals achieved through project interventions implemented even before validation can also be reported and verified through a process of 'retroactive crediting'.

4. Marketing and selling carbon credits: Carbon credits are traded on the VCM based on an Emission Reductions Purchase Agreement between the project developer and the credit buyers. The negotiation of an ERPA is usually done with the help of specialized lawyers. Future contracts can be agreed prior to project development and/or covering a certain stream of carbon credits (see 2.2). Carbon credits can be also sold in a spot market transaction when the credits are issued. The former fetch lower prices but reduces the carbon market volatility risk for the project. Carbon credits have a vintage year reflecting the year they have been issued. Buyers aim to match their emissions with the vintage of the carbon credits, older vintages accordingly are difficult to sell, and a price discount applies.

Figure 3: Operations (ongoing processes) of a carbon project



To efficiently manage and oversee the project operations, an appropriate organisational structure is needed. This is discussed within the next chapter, including the role of the project proponent throughout the project.

4. Project Design and Implementation

4.1. Governance / Management

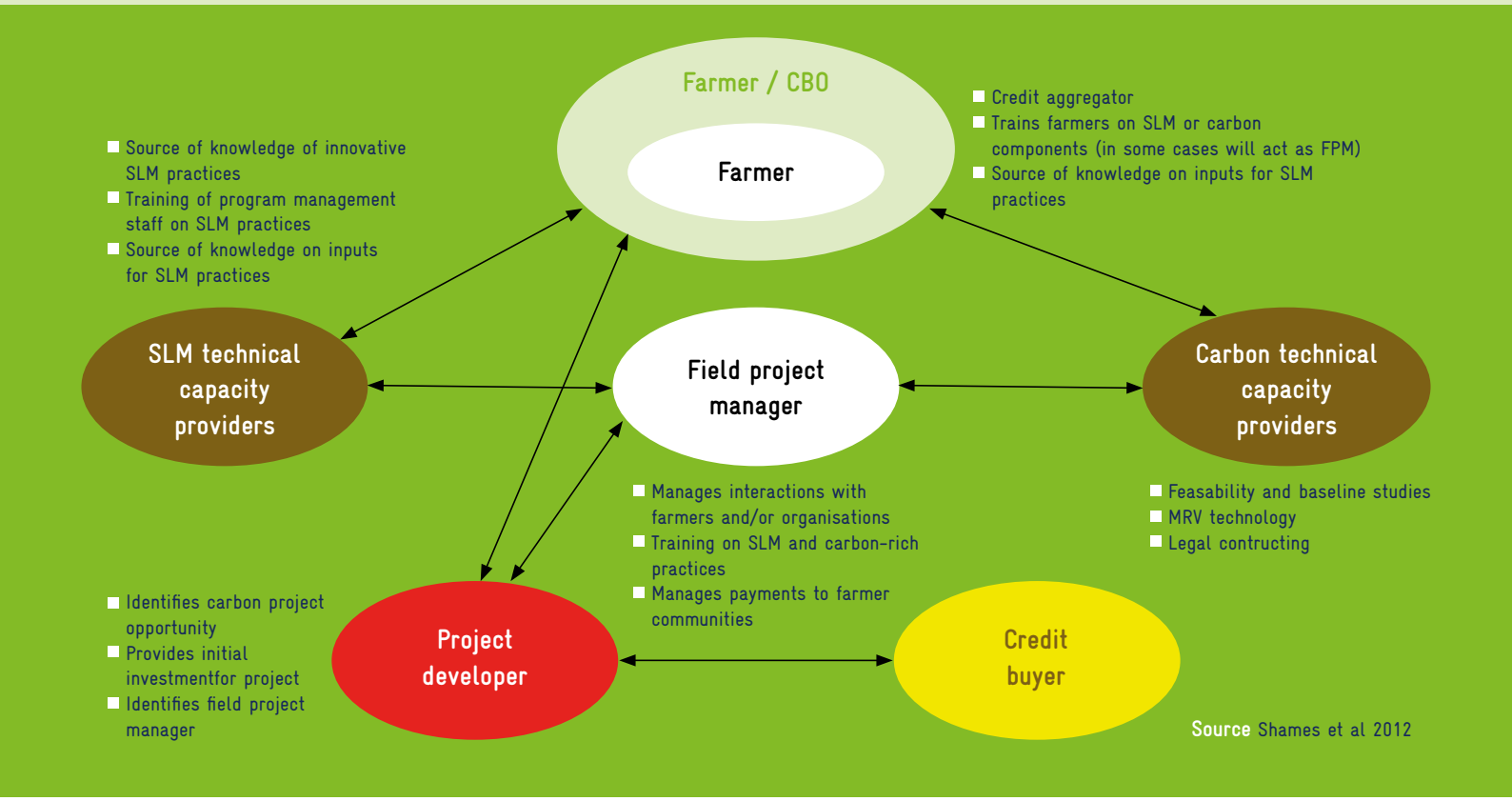
Shames et al. 2012 depict a generic set-up for agricultural carbon projects based on the set-up of the Kenya Agricultural Carbon Project implemented by Vi Agroforestry. In this model, project developers play a facilitating role in which they **identify the project opportunity, provide initial project investment, secure credit buyers, and identify project partners** such as field project managers and technical capacity providers for SLM practices, and carbon MRV. Many projects generally follow a similar approach. However, contextual differences call for variations in the assignment of roles and partnership arrangements between the different actors. This is largely dependent on the strengths and limitations of the project developer.

Typically, proponents of agricultural carbon projects are large non-profit organisations. Proponents could also be local NGOs, social enterprises, national or sub-national governments or intergovernmental organisations (IGOs). In the case of the WKCP, the project proponent is Soil Carbon Certification Services (SCCS)[15], a local not-for-profit organisation which comprises of technical experts and community representatives. SCCS is responsible for **overseeing project management, contracting the project's implementation partners (IPs), carbon monitoring and marketing and selling carbon credits.**

SCCS finances its operational costs through the generated carbon revenue. This includes costs of contracting the services of the IPs. The IPs are NGOs and/or CBOs who are responsible for supporting the smallholders with training and implementation of SLM practices through extension delivery. SCCS contracts these service providers on a

15 Initial project development was funded and managed by GIZ before being handed over to the local project proponent. See section 1.3 for context.

Figure 4: Key roles and functions in a generic smallholder agricultural carbon project



performance basis, which links payments to the achieved emission reduction outcome. This is crucial for mitigating financial risks for the project developer while incentivising performance of IPs and participating landowners.

One distinguishing aspect of agricultural carbon projects from similar development projects is the former's higher demand for technical capacity on the field. This underscores the requirement for a strong field team comprising the following core expertise:

- Community consultation, training facilitation and stakeholder management
- Technical, agronomic knowledge on SLM practices
- Monitoring and evaluation
- GIS area mapping
- Safeguards and risk management
- Other administrative roles including financial, legal and project management expertise

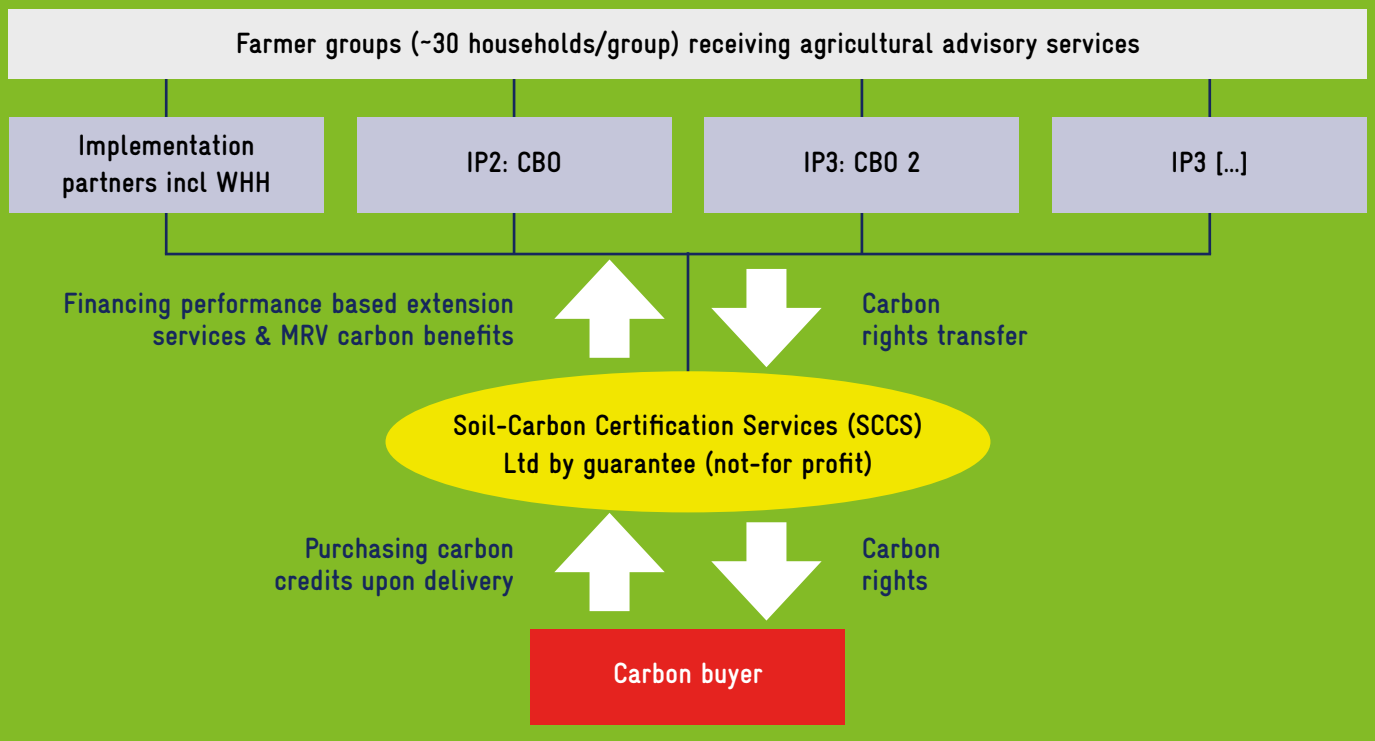
Box 6: Key lessons on governance

1. A suitable governance structure should be established early during the project design.

2. Local NGOs and community-based organizations (CBOs) are trusted by farmers and can efficiently provide agricultural advisory services. However, they are too small to reach the minimum viable projects scale of about 20,000 ha. Hence project proponent should either be a larger umbrella NGO ideally with commercial implementation experience or act as a dedicated service provider for carbon services and the interface between the carbon buyer/investor and the NGO/CBOs (implementing partners).

3. Farmers should be organized in groups to reduce the transaction costs related to the provision of services.

Figure 5: Key roles and functions in the WKCP



Box 7: Key Lessons on delivering extension services for carbon projects.

1. Extension intensity required is context-dependent i.e., depending on farmers needs and capacity, complexity of production systems, markets and existing access to information and inputs.

2. Group training approaches and training of trainers can help to minimise extension costs.

3. Lead-farmer extension approaches e.g., Community Resource Persons increases efficiency of extension-delivery.

4. The use of digital extension tools e.g., mobile applications, SMS-, or phone -based support should be explored where possible.

4.2. Agricultural Extension Service Delivery

The provision of continued extension services to landowners is integral to the sustained implementation and monitoring of SLM practices. This is especially true in projects which involve smallholders as technical support to extension services to help farmers to achieve non-carbon objectives. These objectives include improved soil fertility, higher climate risk adjusted crop yields, diversified farm income and market access for inputs and agricultural products, which reinforces the adoption of SLM practices. Without successful extension, farmers lack access to information to improve their farming systems and to enhance livelihoods including the production of carbon credits.

Conversely, the delivery of extension services is often expensive due to in-field activities. These costs vary between USD 10 to 50 per hectare and year, depending on the extension approach selected, average farm size, **extension intensity, farmer group size and level of aggregation of the project area.**

4.3. Co-benefits and Benefit Sharing

Adopting SLM practices can lead to improved soil fertility and agricultural productivity for smallholders. However, these results take long to materialise, and landowners need short-term incentives to adopt and maintain these practices which can be expensive in terms of required tools, time, labour, and opportunity costs. Carbon revenue, although providing a stream of potential income to incentivise practice adoption, may be too little (at current carbon prices) when distributed across thousands of households to incentivise practice change.

Currently, there is limited empirical data available regarding the magnitude of the effects and the equitable distribution of the co-benefits associated with carbon projects. More research is needed to support the understanding of the co-benefits of carbon projects, which constitute an important factor in the adoption decision.

WKCP is testing a benefit sharing approach where carbon revenues are used to finance agricultural advisory services. Studies in the project area showed a high demand for extension as producers need support and inputs to achieve their primary goals of food and livelihoods security. Public extension services are limited and unlikely to be available for a period of 30 years. Apart from training, extension services provide farm inputs and facilitation of market access through the established community structures. These services are financed through the carbon revenue to re-enforce the permanence of SLM activities while improving the livelihoods and wellbeing of local communities.

4.4. Measurement, Reporting and Verification (MRV)

For the establishment of carbon credits, robust monitoring and quantification systems are required. In a 2022 VCM study by Shell and BCG, 91% of credit buyers ranked Measurement, Reporting and Verification (MRV) as one of their top criteria in credit purchase decisions. Buyers want to ensure that credits have measurable benefits, to minimize reputational risks. For similar reasons, investors also want the credits they purchase to demonstrate their commitment to other sustainable development goals.

For agricultural projects, the relevant carbon pools are:

- Above - and belowground (woody) **biomass**
- **Soil organic carbon (SOC)**

Box 8: Key Lessons on Benefit Sharing

1. Benefit sharing is not "one-size-fits-all". Therefore, challenges, needs, and motivations of a community should first be understood to align benefits.

2. Creation of a benefit sharing plan should be an inclusive process which involves the beneficiaries.

3. Transparent, consistent project messaging is important to manage stakeholder expectations regarding benefits.

4. Project co-ownership through community organisational structures is key to delivering equitable benefits.

5. Integrating gender considerations into project design through preliminary needs assessment and collaborative creation process is advisable.

6. A grievance mechanism is necessary to ensure that concerns among farmers can be articulated and are addressed.

Depending on the project type, emission sources such as **biomass burning, soil emissions, manure, enteric fermentation, nitrogen fertilizer application** and others may also be accounted for by the project. The sources and sinks considered depend on the project scope, activities, and the methodology guidelines.

Monitoring of **biomass carbon** stock changes plays a major role in agricultural projects which promote agroforestry. Stratified random sampling and species-specific allometric models help to determine the carbon stock changes. The models use physical measurements such as diameter, height, and wood density, which can be observed in field surveys or through remote sensing to estimate the carbon content of biomass at different points in time. There are two broad approaches for monitoring **SOC stock** changes: (i) Measurement (direct) and (ii) Modelling (indirect).

Most of the existing cropland projects accounting for the SOC pool have used Verra's VM0017 methodology, which relies on the use of biogeochemical models to predict how the SOC stock changes due to project activities. Such models use data about the soil and climate in the project area as well as farm management data collected through monitoring surveys as input. Tree biomass in agroforestry trees is then accounted using the CDM methodology for af-

Box 9: Solutions for monitoring the soil impacts of sustainable land management.

Verra has announced the development of a new tool expected by the end of 2023 for soil sampling, processing, and analysis to determine soil organic carbon (SOC) stock changes through direct measurements. Such effort to support low-cost soil measurement is needed to scale agricultural carbon projects. However, soil measurement alone has limited application for project applications. This is primarily because significant changes in soil carbon stocks can only be detected after 3-5 years. However, project proponents prefer to monitor and issue credits more regularly to increase cash flow available for project implementation. Additionally, farmer (household) surveys are still needed to track SLM adoption and its socio-economic impacts. MRV methods and tools which combine the benefits of both direct measurements, activity monitoring and modelling approaches are therefore needed.

The Land Degradation Surveillance Framework (LDSF) provides a glimpse of the potential of such integrated approaches. LDSF is a monitoring framework developed by the World Agroforestry Centre (ICRAF) which includes replicable procedures for stratification, field sampling and analysis that support remote-sensing based surveillance of soil and vegetation over time. The LDSF framework relies on a nested sampling design that allows mapping of soil and ecosystem variables at different scales based on open-source earth observation data.

A BMZ funded pilot led by GIZ via the Fund for the Promotion of Innovation in Agriculture (i4Ag) is also aiming to improve the efficiency of soil carbon monitoring on field level via open-source satellite-based technology. The project seeks to develop a digital platform which can automate farm monitoring and the certification of emission reductions/removals. The platform will be able to accurately predict soil organic carbon content from satellite imagery based on calibration of the satellite imagery and ground truth data into a machine-deep learning algorithm.

While these types of tools are needed to enable rapid data collection and analysis, cost reduction and accessibility of soil organic carbon monitoring for non-experts, the different sources of uncertainty they produce must also be adequately accounted for. More involvement of carbon standards is required in these efforts, to provide guidance on estimating their uncertainty and suitability in line with various methodologies. Further alignment of new tools with other aspects of projects' MRV as well as farmer interests is also needed to support long-term implementation.

16 https://verra.org/new-tool-to-determine-changes-in-soil-organic-carbon/

17 https://www.worldagroforestry.org/output/land-degradation-surveillance-framework-field-manual

18 "Satellite-based digital solutions for the valorisation of climate-friendly agriculture" [URL]

forestation and reforestation. However, with the phasing out of VM0017 and a subsequent transition of SLM projects under Verra to VM0042, more emphasis is expected on direct SOC measurements either as a stand-alone approach or in addition to modelling. Box 3 shows how this may work under Approach 1 of VM0042 in the context of smallholder projects. Due to the high cost of direct measurement approaches, there is still the need to develop efficient sampling and measurement approaches to reduce related costs. Many such developments are underway, including the examples in Box 26.

Beyond the carbon benefits, **benchmarking agronomic practices** and **monitoring the social and ecological impacts of carbon projects** is important to increase the appeal of projects to investors as well as minimise risks to all stakeholders and ensure continuing adoption of practices.

Best practice involves identifying focal issues in a project area using participatory approaches during the project design stage. Based on this, Key Performance Indicators (KPIs) for monitoring should be established which can track the project's progress in addressing these issues. KPIs for community wellbeing are usually monitored via household surveys and other participatory approaches e.g., focus groups and interviews. As much as possible, these monitoring activities should be unified with the carbon MRV process to reduce costs and generate inter-connected project data.

Box 10: Key Lessons on MRV

1. Monitoring information systems are key to ensure consistent digital data collection, storage, and processing from different sources.

2. Digital data collection and processing also offers farmers access to information (e.g., farming systems analytics and benchmarking with other farmers).

3. Monitoring and extension activities are closely interlinked. This makes it difficult to estimate monitoring costs independently, and to target a reduction of monitoring costs without affecting extension delivery.

4. Despite technological advancements, farmer surveys and field visits are hard to eliminate as they build trust, promote SLM adoption and are needed to track implementation and socio-economic impacts.

5. Devolving monitoring to farmers can save costs but investments are needed in building capacity and subsequent quality assurance.

6. Multi-purpose monitoring reduces costs and generate multi-benefits. E.g., combined socio-economic and carbon monitoring surveys, or combined soil and vegetation assessments could provide streamlined data.

7. Monitoring and certification of non-carbon impacts offers potentially higher carbon pricing. However, this also incurs additional project costs.

8. Where possible, MRV should piggyback on existing organisational structures.

9. Carbon standards and project developers need to play a role in piloting and standardising new technologies especially testing their suitability for smallholder and agroforestry systems.

5. Financial Overview

5.1. Business Case

Project developers must create a viable business case that enables them to recover costs and ensure the economic sustainability of their operations while attracting investments. This section aims to provide a broad understanding of cost and revenue dynamics of a typical agricultural carbon project.

Costs

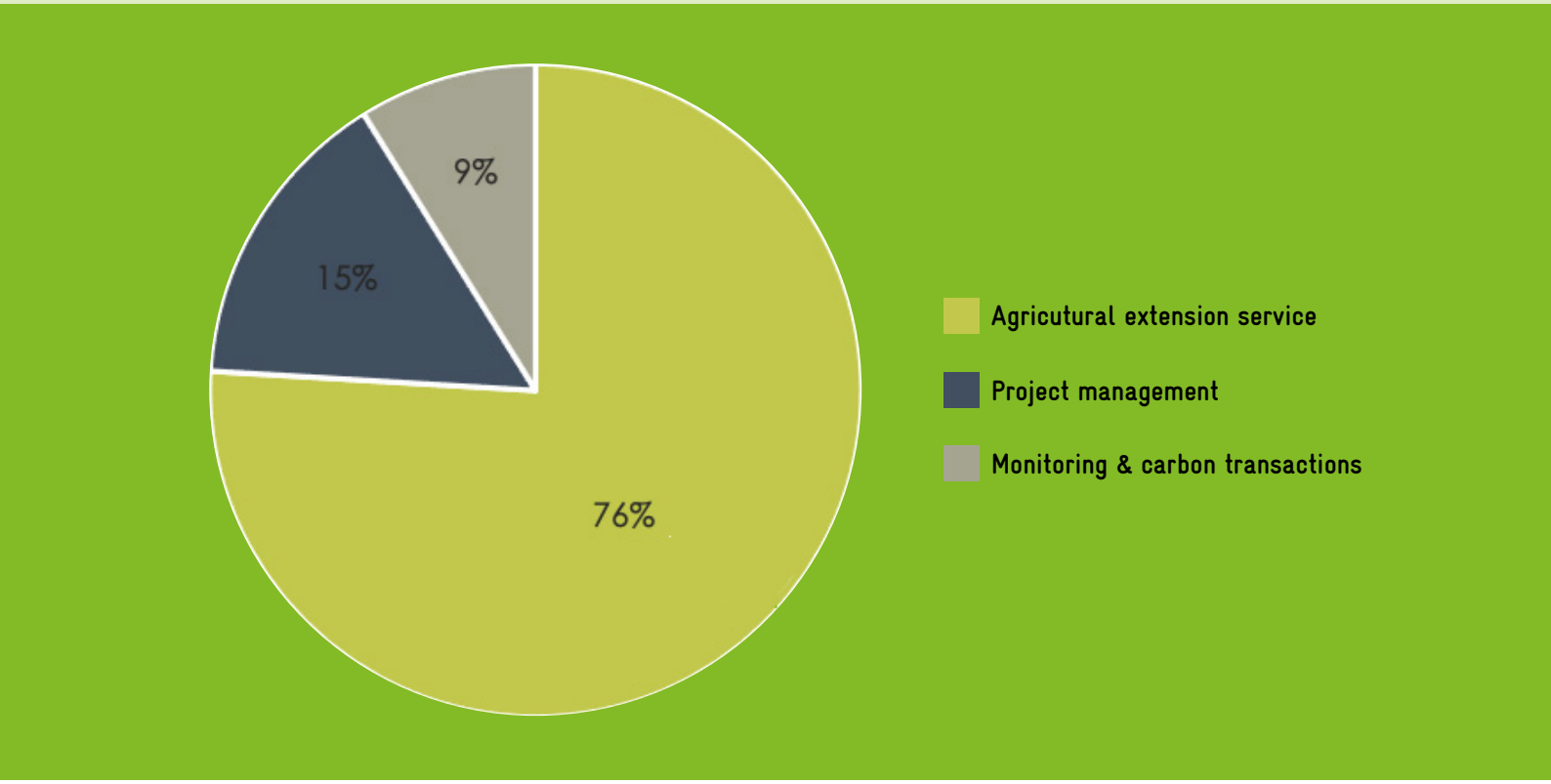
The three main cost categories of an agricultural carbon project over 20 years are presented in Figure 6, using the WKCP as reference. In the WKCP set-up, the project developer is a non-for-profit entity, which received significant support from GIZ. Hence, depending on the setting, the project management and carbon related costs might be higher. In the initial phase, project management costs and monitoring & carbon transactions are also higher given the project set-up requirements, stakeholder consultations and consultant costs to support the project validation (compare chapter 2.2).

1. Agricultural extension service costs. These costs vary widely from USD 10 to 50 per hectare and year depending on the extension approach used, average farm size, extension intensity, farmer group size and level of aggregation of the project area. Projects have high initial adoption costs which later even out in the so-called continuation phase.

2. Project management costs. This involves office set up and maintenance costs, cost of salaries and staff responsible for project management, administration, and technical support. These costs are mostly fixed and benefit from economies of scale.

3. Monitoring and carbon transaction costs. These are also highly variable depending on the project size (number of farms) and monitoring approach used. New technologies and innovation in monitoring could potentially lower costs or decouple monitoring costs from project scale. Carbon transaction costs make up about 1% of this category. These include costs of project verification and the various fees charged by carbon registries and third party

Figure 6: Cost components or an agricultural carbon project (WKCP)



VVBs. After the initial validation event, verification and C transaction costs are usually incurred every 2-5 years. These are mostly fixed costs and do not depend on project scale.

Revenue

Carbon revenue is influenced by:

1. Project size. Larger project areas can aggregate more credit volumes.

2. Sequestration rate. This is mainly determined by the agro-ecological zone and the cropping system. The higher the carbon sequestration rates per hectare, the more carbon credits can be generated. Projects including agroforestry (trees) can sequester more carbon than projects where only soil organic carbon is sequestered. The carbon sequestration rate also depends on baseline conditions and inherent soil, bio-mass, and climatic properties in the project area.

3. Credit pricing. The pricing of carbon credits depends on the market situation, the co-benefits of the project, and the contractual arrangements. Long-term forward contracts fetch lower prices but reduce the price risk for the project. While spot market transactions can fetch higher prices, but also incur higher credit marketing costs and require expertise and networks. Since VCM credits are traded over the counter there is a lack of transparency related to the credit prices.

5.2. Project Financing

While agricultural carbon projects can be self-sustaining in the long run, pre-financing a carbon project comes with a major challenge. Carbon revenues may take 3-5 years until the project reaches a break-even point (Figure 8). The project cash flow below assumes that the project is pre-financed with grants and that all the carbon revenues are invested in the agricultural advisory services.

Therefore, project developers need a bridge financing medium for initial implementation. There are several types of funding options available for carbon project developers involving a mix of public and private organisations:

- **Donations or grants** if available e.g., in the context of a development project can be used to cover the project development costs awarded by government agencies, foundations, trusts, or other grant-making institutions. However, grants are limited and not sufficient for large scale implementation. GIZ / KfW, Green Climate Fund and GEF provided respective funds in the past.

Box 11: Key lessons on developing a business case.

1. Business case must consider alignment with farmer interests e.g., agroforestry may be used as a lever for more carbon sequestration, but farmers must be convinced of the value of this additional practice.

2. Agricultural advisory services are the largest project cost component, efficient service delivery based on robust impact monitoring is key to ensure benefits for farmer.

3. Quality and costs of agricultural advisory services should be benchmarked, and service provider engaged using performance contracts.

4. Economies of scale determines minimum viable project size and favours larger farms. Mechanisms to support also landless farmer and small farms are however crucial for social equity.

5. Carbon transaction and monitoring costs should require not more than 10-15% of carbon revenues in order to utilize the remainder for activities that are directly benefiting farmers.

6. A minimum carbon price of USD 10-15 per carbon credit is required for smallholder agricultural carbon projects to be financially viable.

7. The carbon sequestration rate as presented above determines the carbon credits that can be generated per hectare. However, generating few carbon credits per hectare and year does not necessarily make a project less attractive. Grassland projects e.g., generate only 1-2 carbon credits per hectare and year, but large areas are available. Project in drylands also generate few carbon credits per area, but the benefits for climate change adaptation can be significant. However, such projects are not feasible to finance by the private sector unless a price premium can be achieved.

Note – The business case will look different depending on project size, farm structure, required agricultural advisory services and efficiency and capacity of implementers.

- **Concessional loans** are a type of debt finance instrument that is offered below-market terms. Concessional loans are typically issued by development finance institutions (DFIs) or philanthropic investors. Concessional loans may have lower interest rates than standard commercial loans, longer repayment terms, or deferred repayment schedules. They may also be offered with more flexible collateral requirements, grace periods, or other conditions that make them more accessible to borrowers who might not qualify for traditional loans. DFIs and philanthropic foundations such as Rabobank or Mastercard Foundation are typical organisations offering this financial instrument.

- **Market rate loans** refers to debt that is provided at market rate by public and private institutions and may have additional support provided alongside e.g., technical assistance for riskier investments that commercial capital would not normally invest. However, agricultural carbon projects focusing on smallholder farmers cannot offer any collateral and therefore this financing instrument is rarely used for such projects. ACORN is considering to set-up a related vehicle.

- **Private equity** is offered by institutional investors or organisations directly or via dedicated impact investment funds. This instrument can provide upfront financing to project developers for large-scale project implementation and maintenance over periods of 10 to 20 years in return for return on equity. When investing equity, the investor formally owns a portion of the project. From the perspective of the project holder, raising capital through equity is less risky than debt, but it simultaneously forces the project developer to give up authority and share future profits with other equity owners. Most of the equity related to agricultural carbon projects is invested in dedicated carbon funds managed by specialised private fund manager. Funds are provided by large cooperates with large carbon credit purchasing programmes such as the oil and gas industry, technology companies operating data processing warehouses (Google, Meta, Microsoft) and specialised funds such as Livelihoods funds, where DEG is co-invested, Mirova LDN Fund or Climate Asset partners who recently set-up a large fund.

- **Upfront finance** is offered by private organisations who commit financially to a carbon project in return for the carbon credits. Payments may be made upfront or at agreed intervals based on verified and reported results. These agreements can be structured in various ways, including fixed-price contracts, market-based pricing mechanisms, or long-term commitments. However, upfront finance is expensive since finance provider expect carbon credits at a steep discount (10-50%) in return for pre-financing. The less developed a project the higher the discount expected.

Figure 7: Costs and revenues over a project lifetime[19]

19 Diagram is simplified to depict an eventual net-zero balance, excluding profits for payback of entry and initial costs. This could be the case where non-commercial finance instruments e.g., grants cover initial funding and proponent is a non-profit.

Table 3: Financing options including pros and cons.

Type	Pros	Cons
Equity	Long term security against market fluctuations. No interest paid.	project developer gives up authority and shares future profits with other equity owners. high return expectations given the risk involved
Upfront finance	Risk sharing with investor	Discounting on credit price
Grants / donations	No repayment needed.	Limited funds available not scalable
Concessional loans	More favourable repayment terms than market loans	It requires public grants for blending with commercial financing and therefore is also not scalable
Market rate loans	Project developer can maintain project autonomy	Costly considering the risk involved. Lack of collateral is a key barrier to attract loans

In summary, large corporates from emission-intensive industries with significant residual emissions such as oil and gas, transport and logistic and technology firms are the most promising investors for agricultural carbon projects. They prefer carbon credits return financing arrangements with experienced project developers operating large project portfolios e.g., Livelihoods Funds. Since respective project developers are rare, investor often set-up their own teams.

5.3. Marketing and Selling Carbon credits

Carbon credits are traded on the Voluntary Carbon Market through Emissions Reductions Purchase Agreements (ERPAs) between project developers and credit buyers. An ERPA, is a legally binding contract between a buyer and seller of GHG emission reductions.

The selling price of carbon credits depends on market forces (supply and demand) as well as project co-benefits (additional value of the project) and other project features. Since the market is not regulated, the price depends on the marketing skills of the project developer as well as on highlighting the attractive features of the project and matching the right type of project to the right buyers.

Identifying a buyer. Corporate offtake have either established trading desks and carbon credit generation teams or rely on brokers that are buying or even developing projects for them. Given the expertise required it is difficult for an agricultural carbon project to directly identify a buyer. Long-term contracts usually lock in a discounted price for the carbon credits in return for mitigated carbon price volatility and secured project financing. One-off / spot market transactions may fetch higher carbon prices, while coming with the risk of uncertainty and exposure to market fluctuations of supply and demand. Reputation risks selecting a buyer need to be considered, as they might burden the project with costly communication needs or cancelation of project operations. Additionally, the overall credibility of the principle of voluntary offsetting is strengthened if offsets are used only by buyers with a credible climate strategy and who compensate only residual emissions which cannot be avoided or reduced.

Box 12: Carbon Marketplaces

An emerging VCM trend is that of marketplace platforms (e.g., Acorn, Boomitra, Nori, Earthbanc, aesti) which allow project developers to register a project and sell credits directly to buyers via the platform against a platform service fee. Such platforms provide proprietary MRV infrastructure that may or may not be independent of the major standards. The appeal for project developers is that they basically outsource MRV and carbon transactions. However, there is the need to ascertain the integrity of the quantification approaches used by such platforms and to be assured that there is no double accounting hence platforms must ensure that projects are not already registered by other standards. A third-party verification of the platform's mechanisms should be a minimum quality requirement.

Drawing up an ERPA. An ERPA defines the volume, quality, timeline, and price for the carbon credits to be delivered and in return the financing to be provided. It also includes buyer and seller responsibilities, risk allocation provisions, dispute resolution, delivery and payment terms, termination provisions, and amendment processes. ERPAs should also include provisions for managing risks that may arise during the project, such as force majeure events or changes in laws or regulations. Project developers may use Standard ERPAs or employ the services of experts in drawing up ERPAs.

6. Conclusions and Recommendations

Agricultural carbon projects provide significant climate adaptation, food security and livelihood benefits. Millions of small-scale family farms can benefit if local project implementers, investors and development partners join forces to scale this project type. The nimble experience gained in the GIZ supported project in Western Kenya highlights the challenges and opportunities.

In comparison with other NbS projects, such as large-scale REDD+ projects, the marginal abatement costs and the local capacity required is higher. Therefore, despite the unique development benefits only a few agricultural carbon projects exist. Increased recognition of its numerous co-benefits along with a particular interest in removal credits has recently led to a higher demand for this project type. As a result, the carbon price is now starting to be sufficient to cover the agricultural extension services from the carbon revenues. **However, project implementation experience is limited, and greater capacity of project developers is needed to replicate and scale the small number of existing agricultural carbon projects.**

Carbon project development is faced with significant uncertainty regarding national policy developments related to Article 6.4 of the Paris Agreement. There is a risk that countries eager to benefit from carbon revenues overlook that agricultural carbon projects have high investment and operating costs and adopt carbon taxes or royalties that act as investment barriers for such projects. **It is therefore important to inform policy makers that a one size fits all carbon policy is counterproductive and that project type specific aspects have to be considered. VCM project investor, broker and retail clients should be sensitized for the climate resilience and food security features of this project type, which justifies the premium price.**

Given the low interest in the past, the choice of carbon accounting methodologies offered by major carbon standards which are suitable for small-scale farms is limited. VCS recently even deactivated the most suitable methodology at hand. Projects wishing to account for soil carbon benefits of cropland SLM practices are now faced with increased monitoring cost demands, further squeezing into already-slim profit margins. **This underscores the need for project developers and other stakeholders to be engaged in the methodology development process and in research for development of new MRV procedures.** Currently, research on improving MRV procedures by integrating modelling, activity monitoring, direct measurements and remote sensing is making progress but is not targeted towards methodology and project development.

Smallholders rely on the provision of agricultural advisory services to sustain SLM practices and its associated benefits. At the same time, extension service delivery is the highest component of carbon project costs. **Optimising service delivery will therefore yield the highest return for farmers and the project economics. Aligning the project's business case to farmer objectives remains key to successful project development.** This applies to selecting the project's SLM practices, extension delivery and MRV approach and benefit sharing plan.

Despite the challenges, there is growing commitment at all levels to develop agricultural carbon projects. The 500 million family farms are eager to contribute to combat climate change, while generating a living income and adopting climate resilient farming practices. The private sector is ready to invest, and Core Carbon Principles have been proposed to ensure the integrity of the market and the use of carbon credits. **The G7 under the presidency of Germany has launched the CompensAction initiative as a platform to mobilize governments, civil society, and investment at scale from the private sector to support related farm income generation and diversification.**

These commitments create ample opportunities for carbon project developers who seek to participate in the voluntary carbon market by promoting sustainable land management (SLM) practices, which, in turn, can contribute to food security, enhance livelihoods, and foster multiple ecosystem services.

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Annexes

A. Glossary

Agricultural (carbon) project: A carbon project which focuses on reducing land use related emissions or sequestering carbon in soils through a change in agricultural practices or management of agricultural land (cropland or grassland). Although this guidebook focuses on SOC, some projects also aim to increase carbon stocks in biomass. In addition to climate change mitigation, such projects also support smallholder livelihoods, food security and biodiversity.

Article 6: In the context of the Paris Agreement, "Article 6" refers to a section within the agreement that focuses on international cooperation to addressing climate change. It includes provisions related to emissions trading, cooperative approaches, and the use of internationally transferred mitigation outcomes to help countries achieve their climate goals more effectively. Referenced in this guidebook are section 6.2 which establishes a framework for a voluntary mechanism and section 6.4 focusing on non-market approaches to mitigation.

Carbon project: A carbon project is an initiative or undertaking aimed at reducing greenhouse gas emissions or removing carbon dioxide from the atmosphere to mitigate climate change. It involves implementing specific project activities that result in measurable emission reductions or carbon sequestration. Emission Reductions (ERs) generated by such projects can be sold and traded in Voluntary Carbon Markets, thus helping to achieve corporate ER targets. NbS carbon project types are of especially high demand due to their co-benefits.

Corresponding adjustment: A corresponding adjustment is a term used in the context of the Paris Agreement on climate change. It means that when one country sells or transfers emissions reductions to another country, it must adjust its own emissions balance accordingly. This is to prevent double counting of the same emissions reductions by both countries[20]

Credit: A carbon credit, also referred to as a verified carbon unit (VCU) or verified emission reduction (VER) is the equivalent of 1 metric tonne of CO2 emission reductions / removals traded on the voluntary carbon market.
Methodology: Methodologies describe the procedures, data and parameters needed to estimate and monitor carbon benefits under a specific standard.

Measurement, Reporting and Verification (MRV): MRV of carbon emissions is a critical component of climate change mitigation efforts, as it ensures transparency and accountability in tracking progress toward emission reduction goals. Measurement involves accurate quantification of carbon emissions and removals, often using scientific methods and standardized protocols. Reporting provides transparent and comprehensive information on the measured emissions and removals including detailed documentation of the methods used, data sources, and calculations. Verification requires independent assessment of the reported data to ensure its accuracy and consistency. This is usually done by third-party auditors.

Nature Based Solutions (NbS): Nature-based solutions are actions to protect, sustainably manage, or restore natural ecosystems, that address societal challenges such as climate change, human health, food and water security, and disaster risk reduction effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.[21] In the scope of the voluntary carbon market, Nature-based solutions are carbon credit projects in the Agriculture, Forestry and Other Land Use (AFOLU) sector as well as blue carbon.

Offsetting: Offsetting refers to the practice of compensating for greenhouse gas emissions or environmental impacts by undertaking activities that result in the reduction or removal of an equivalent amount of emissions or environmental damage elsewhere. It is a strategy employed to neutralize residual emissions to achieve carbon neutrality or reduce the overall carbon footprint of an individual, organization, or event.

Paris Agreement: The Paris Agreement is an international treaty that aims to address climate change by bringing together nations to work collectively towards limiting global warming and its impacts. It was adopted on December 12, 2015, at the 21st Conference of the Parties (COP 21) to

20 https://www.wri.org/insights/what-you-need-know-about-article-6-paris-agreement

21 Climate Explainer: Nature-Based Solutions (https://worldbank.org)

the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, France. The key goal of the Paris Agreement is to keep the global average temperature rise well below 2 degrees Celsius (°C) above pre-industrial levels and to pursue efforts to limit it to 1.5°C.

Project proponent (or developer): A project proponent is an individual or entity that initiates and develops a project that aims to generate emission reductions or removals and seeks validation and verification of its project activities under a specific standard or program. The project proponent takes the responsibility for designing, implementing, and managing the project activities in accordance with the requirements and guidelines set forth by the chosen standard or program.

Standard / carbon standard: A carbon standard refers to a set of guidelines, criteria, or specifications that define the requirements and procedures for measuring, reporting, and verifying greenhouse gas emissions or carbon-related activities. It establishes a consistent framework for assessing and comparing carbon-related activities, such as emissions reductions, carbon offset projects, or carbon footprint calculations. Carbon Market Standards include VCS by Verra, Gold Standard and Plan Vivo.

Voluntary Carbon Market: The voluntary carbon market refers to a system in which individuals, organizations, or companies can voluntarily participate to offset their greenhouse gas emissions by purchasing and trading carbon credits. Unlike compliance markets, where carbon credits are mandated by regulations, the voluntary carbon market operates on a voluntary basis, allowing entities to act beyond their regulatory obligations and demonstrate their commitment to reducing their carbon footprint.

B. AFOLU methodologies of the 3 major standards

Method	Standard	Project Type	Eligible Activities
VM0017 - Adoption of Sustainable Agricultural Land Management, v1.0	VCS	ALM	projects that introduce sustainable management practices to an agricultural landscape, mostly characterized by a multitude of smallholder farmers
VM0022 - Quantifying N2O Emissions Reductions in Agricultural Crops through Nitrogen Fertilizer Rate Reduction, v1.1	VCS	ALM	projects in the United States that optimize nitrogen fertilizer through the use of verifiable best management practices, specific to the crop, soil and environmental conditions of the project
VM0042 - Methodology for Improved Agricultural Land Management, v1.0	VCS	ALM	Practices include, but are not limited to, reductions in fertilizer application and tillage, and improvements in water management, residue management, cash crop and cover crop planting and harvest, and grazing practices.
Soil organic carbon activity module: increasing soil carbon through improved tillage practices	Gold standard	ALM	Changing soil tillage practices
Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation	Gold standard	ALM	reduced anaerobic decomposition of organic matter in rice cropping soils. This includes activities such as rice farms that change the water regime during the cultivation period from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions; alternate wetting and drying method and aerobic rice cultivation methods; and rice farms that change their rice cultivation practice from transplanted to direct seeded rice (DSR)

continuation

Method	Standard	Project Type	Eligible Activities
VM0021 Soil Carbon Quantification Methodology, v1.0	VCS	ALM	changes to agricultural practices, grassland and rangeland restorations, soil carbon protection and accrual benefits from reductions in erosion, grassland protection projects, and treatments designed to improve diversity and productivity of grassland and savanna plant communities
VM0026 - Methodology for Sustainable Grassland Management (SGM), v1.1	VCS	ALM (Grassland)	Eligible project activities include a broad range of SGM activities such as improving the rotation of grazing animals, limiting the grazing of animals on degraded pastures and restoration of severely degraded lands.
VM0032 - Methodology for the Adoption of Sustainable Grasslands through Adjustment of Fire and Grazing, v1.0	VCS	ALM (Grassland)	adjustment of the density of grazing animals and the frequency of prescribed fires into an uncultivated grassland landscape
AR-AMS0007 - Afforestation and reforestation project activities implemented on lands other than wetlands --- Version 3.1	CDM	ARR	Applicable to agroforestry
AR-ACM0003 (large-scale)- Afforestation and reforestation of lands except wetlands --- Version 2.0	CDM	ARR	AR
Afforestation/Reforestation GHG Emissions Reduction and Sequestration Methodology v1.0	Gold standard	ARR	All A/R excluding wetlands
(Under development) Methodology for Afforestation, Reforestation and Revegetation Projects	VCS	ARR	All afforestation, reforestation, and revegetation activities (excluding on organic soils or wetlands)
Smallholder dairy Methodology	Gold Standard	Dairy	dairy production operations, specifically from cattle and buffaloes only (not sheep, goats, or others), in a defined geographical region (i.e., project region)
VM0012 - Improved Forest Management in Temperate and Boreal Forests (LtPF), v1.2	VCS	IFM	improving forest management and preventing logging in temperate and boreal forests
VM0034 - Canadian Forest Carbon Offset Methodology, v2.0	VCS	IFM	

continuation

Method	Standard	Project Type	Eligible Activities
VM0003 - Methodology for Improved Forest Management through Extension of Rotation Age, v1.2	VCS	IFM	improving forest management practices to increase the carbon stock on land by extending the rotation age of a forest or patch of forest before harvesting.
VM0010 - Methodology for Improved Forest Management: Conversion from Logged to Protected Forest, v1.3	VCS	IFM	preventing logging of forests that would have been logged in the absence of carbon finance. This methodology is applicable where the baseline scenario includes planned timber harvest, and under the project scenario, forest use is limited to activities that do not result in commercial timber harvest or forest degradation
VM0015 - Methodology for Avoided Unplanned Deforestation, v1.1	VCS	REDD	Curbing deforestation
VM0007 - REDD+ Methodology Framework (REDD+MF), v1.6	VCS	REDD	This methodology is applicable to forest lands, forested wetlands, forested peatlands, and tidal wetlands that would be deforested or degraded in the absence of the project activity.
AR-AM0014 (large-scale)	CDM	Wetlands	
AR-AMS0003	CDM	Wetlands	
VM0033 - Methodology for Tidal Wetland and Seagrass Restoration, v2.0	VCS	Wetlands	Restoration of tidal wetlands
Small-holder Agriculture Monitoring and Baseline Assessment (SHAMBA) Tool	Plan Vivo	ALM	Tree planting, agroforestry, and agricultural interventions that increase organic inputs to soils and/or reduce burning of fields and agricultural residues.

C Estimated carbon transaction costs.

Cost point	Value (USD)	Frequency	Assumption / comment
Verra registry account opening/ maintenance fee	500	Yearly	VCS program fee schedule v4.3
Pipeline listing request fee	1000	Once when draft PDD is listed in the registry	VCS program fee schedule v4.3
Project registration request review fee	2,500	Once when project has been validated	VCS program fee schedule v4.3
Validation/ verification event	28,000	Year 0, then every 3-5 years	Costs related to Validation Verification Body (VVB).
Consultant costs for verification / validation support	20,000	As needed	Optional, service cost estimate
Credit issuance levy	0.2 per credit	At issuance of carbon credit	VCS program fee schedule v4.3
Legal support for Concluding ERPA	10,000	As needed	Optional, service cost estimate if ERPA is not developed by the buyer

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn

Friedrich-Ebert-Allee 36 + 40
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1 – 5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de