Info Note

How soil carbon accounting can improve to support investment-oriented actions promoting soil carbon storage

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NOVEMBER 2020

Key messages

- The financial community needs a standardized, low-cost, fit-for-purpose approach to soil organic carbon (SOC) accounting that encourages investment and adapts to the climate market.
- To encourage investments, an accounting system should provide "value for money," align with global goals and support co-benefits, while safeguarding reputational risks.
- Building a sequenced approach to improve accounting accuracy requires planning to reduce uncertainties of the accounting systems overtime.
- Developing low-cost SOC accounting requires i) focusing on a few high-quality direct measurements (opposed to multiple low-quality measurements), ii) reducing the uncertainty of models, and iii) enhancing capability to easily incorporate farm-level activity data.
- Moving to hybrid measurement approaches (a mix of direct measurements with modeling and remote sensing) seems to be the most cost-effective pathway to achieve low-cost SOC accounting systems.

Enhancing soil health can improve agricultural productivity and soil organic carbon (SOC) sequestration. The United Nations Framework Convention on Climate Change's (UNFCCC) Koronivia Joint Work on Agriculture, Sustainable Development Goal (SDG) 15 and the Land Degradation Neutrality Framework demonstrate the increasing attention of policymakers to the importance of SOC for land productivity and food security. In addition, the 4 per 1000 Initiative has been promoting a global partnership to facilitate multiple stakeholders to encourage action at all levels to increase SOC stocks globally.

Despite broad international attention, a large gap remains between the potential of SOC sequestration and the implementation of practices on the ground. As the investment community seeks to improve its climate impacts, many organizations are now asking how to best support the implementation of those practices. Diverse opportunities for public and private finance exist, and more are emerging. For example, the United Nations Convention to Combat Desertification (UNCCD) set up the Land Degradation Neutrality (LDN) Fund as an "impact investment fund blending resources from the public, private and philanthropic sectors in support of achieving LDN through sustainable land management and land restoration projects undertaken by the private sector worldwide."

One major constraint has been the need for transparent, accurate, consistent, and comparable methods for measurement, reporting and verification (MRV) for changes in SOC stocks, notably through new technologies and enabling standardized verification protocols at low transaction costs. Promising approaches combine practical, user-friendly tools with site-specific modeling and the use of geospatial data sources and blockchain technology.

In September 2020, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS),

the World Bank (WB), The Nature Conservancy (TNC), the 4 per 1000 Executive Secretariat, and the Meridian Institute held the webinar “Soil Carbon and Finance” and a subsequent hackathon where experts from the soil science, finance and development communities discussed ***how soil carbon accounting could improve to support investment-oriented actions promoting soil health and carbon storage.*** These events examined opportunities for using novel methods and frontier technologies that enable linking technical practices with finance and policy for accurate and cost-efficient SOC accounting. Here, we summarize the major conclusions of the meetings.

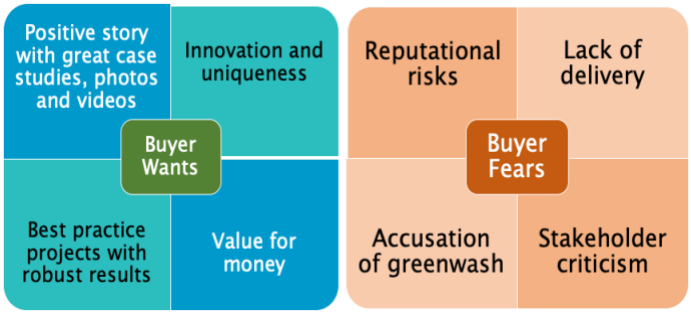
Finance community needs

Investors seek a “good enough,” standardized, accurate and low-cost approach to SOC accounting that encourages investment (e.g., sustainable finance and result-based finance) but also evolve to suit carbon market standards as data, modeling, and sophistication of MRV systems improve.

Representatives of the financial community stressed that to encourage investments in SOC projects, MRV should provide a significant and innovative rationale for the use of funds (value for money), align with best practices and global goals (e.g., Paris Agreement and SDGs), support positive impact stories and mitigation co-benefits (e.g., water and biodiversity conservation and social improvements), and safeguard reputations by avoiding stakeholder criticism and lack of delivery and accusations of greenwashing (Figure 1). As MRV of SOC evolves into carbon offset and inset (offsetting within companies) markets, the major characteristics investors seek are:

- Credibility of reduction and removal measurements
- Contribution to the level of ambition of the Paris Agreement goals
- Consistency with a long-term climate strategy
- Clear economic and social impact at the local level and contribution to sustainable development
- Level of ambition in the project
- Independent assessment
- Cost-effectiveness for farmers, investors, and other stakeholders

Figure 1. Voluntary offset market investors’ expectations and concerns (Source: Chandra S. Sinha, World Bank).



Proper SOC accounting for MRV systems: goals for climate finance

A key action before designing SOC accounting for MRV systems is to identify the project’s climate finance goal and modality. This step defines the level of effort necessary to operationalize the accounting system. Climate finance modalities can be practice-based, performance-based payments, and carbon credit markets, in which the accounting system differs in the level of accuracy and certainty required (Figure 2).

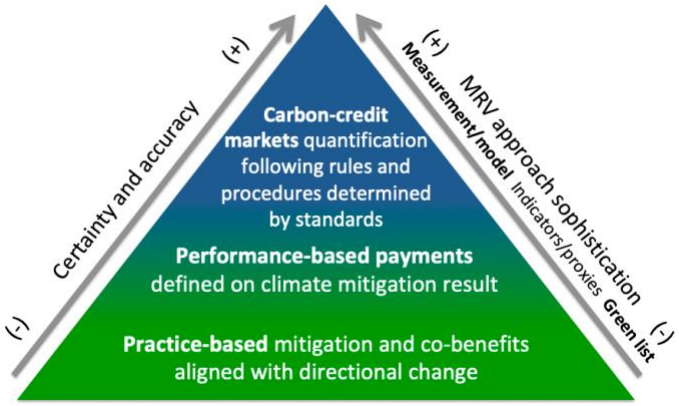


Figure 2. Fit-for-purpose MRV of soil organic carbon.

Climate finance modality

- **Practice-based**: practices aligned with climate change mitigation and co-benefits (e.g., water and biodiversity conservation), where the certainty of directional change is likely, but the impact level is not measured. For example, companies or loans using "green lists" of eligible practices; "good enough" methods (lowest requirements).
- **Performance-based**: payments based on defined climate mitigation results supported by an accounting system that fosters confidence in impacts, although medium to high quantification uncertainty applies (intermediary requirements).
- **Carbon-credit markets**: quantification of climate mitigation results following rules and procedures determined by protocols and standards under third-party verification (e.g., CDM, Verra and Gold Standard standards), which lowers uncertainties and increases the credibility of result (highest requirements).

All three climate finance modalities require an internationally peer-reviewed methodology that is fit-for-purpose.

Accounting systems can be improved over time. For example, an MRV could begin by demonstrating that project interventions are aligned with climate change mitigation and co-benefits, without measuring the impact level. This could be done, for instance, through the development and use of “green lists” of eligible practices (Wironen 2018).

MRV could also be improved by adopting an accounting system that increases confidence in eligible practices'

impacts by quantifying mitigation or relevant indicators. These systems can be suitable for performance-based systems. The use of greenhouse gas (GHG) calculators (e.g., IPCC-based; Colomb et al. 2013) or proxy-indicators (Wilkes et al. 2020) can help reduce costs.

Improving MRV further to be suitable for carbon market accounting would require improving accuracy and uncertainty in quantifying climate mitigation to increase credibility. This usually requires more intense activity data collection and the use of models, following rules and procedures determined by carbon market protocols and standards, and may rely on third-party verification.

Building a sequenced approach towards "market grade" SOC accounting

Building a cost-effective, accurate, and credible accounting system towards carbon-market linked incentives means reducing the system's uncertainty over time. Reducing uncertainty necessitates overcoming barriers related to the cost of collecting activity data, accessibility, and technical capacity to use models and remote sensing, and the viability of transactions for smallholder farmers, especially in developing countries (Table 1).

Table 1. Challenges and actions for improving SOC accounting for MRV systems.

Challenges	Actions
Data collection (cost, time, effort, quality availability)	● Fill gaps using data from scientific literature. ● Combine MRV data collection with existing activities, such as extension, farm management record-keeping or reporting requirements of buyers. ● Focus on a few high-quality measurements. ● Use remote sensing to reduce the costs of activity data collection.
Model use and application	● Standardize how models are used. ● Make models more accessible to project experts. ● Improve the technical capacity of projects to use models. ● Encourage collaboration between projects and external groups.
Cross-cutting	● Use a land aggregation approach. ● Use C-credit discounts (at a viable level for smallholders). ● Use proxy indicators for SOC.

In this context, it is worth understanding the key actions for building a sequenced approach for practice- and performance-based payments to evolve into a carbon market. Three guiding questions could be used to begin:

1. What is the current or planned approach for SOC accounting for this project?
2. How could SOC MRV or accounting methods be improved to help meet the project's finance goals and the investors' needs?
3. What are the practical, priority next steps for this project?

Hybrid methods, which use a combination of direct measurement, modeling, and remote sensing seem to be the best way to attain optimal cost-effective SOC accounting (Paustian et al. 2019; Smith et al. 2019).

The cost-effectiveness of SOC measurements can be improved by gathering better activity data at the project level (e.g., soil tillage and management). The collection of activity data can also be done with low-cost methods, such as through partnerships with farmers or using smartphones, interviews, scientific literature, and expert consultations. Data gaps can be filled using national and global databases (e.g., ISRIC, FAOSTAT). Bundling other benefits (e.g., water or biodiversity) with SOC credits can increase the value of the credit earned and reduce the proportional cost of MRV. Conducting these measurements in tandem may be less expensive than doing the measurements separately.

Finally, it is a good practice to consider design features that ensure the accounting system's integrity. Look at project components that go beyond the measurement itself, especially those related to reducing the risk of impermanence or non-performance. Good practices involve adopting discounted carbon credits to account for impermanence and accuracy risks, setting aside a pool of carbon credits as a buffer against shortfalls in future performance, accounting at the landscape scale to spread risk over large areas, or using verification, especially by third parties. The implementation of good practices should not jeopardize a project's viability.

Innovations for SOC accounting in agriculture

- **Soil sensors**: improve capacity to measure SOC and key variables (e.g., SOC concentration and bulk density) at lower costs. Soil sensors could be used in key areas for SOC stocks monitoring to improve monitoring and model calibration.
- **Remote sensing**: provides low-cost activity data collection on land cover and agricultural practices at landscape levels. It can be coupled with modeling to significantly reduce the cost of monitoring and verifying emission reduction estimates.
- **Land aggregation**: a procedure where farmers or projects are grouped or 'bundled' into a "single project," thereby reducing monitoring and verification costs through economies of scale. Aggregation allows sites with relatively small emission reductions to achieve sufficient volume to offset monitoring and other project costs.

Steps for developing accurate and "fit-for-purpose" SOC accounting

1) Identify the climate finance goal.

2) Choose an internationally peer-reviewed methodology and adapt it to site and project conditions.

3) Plan to improve accuracy and certainty over time.
   3.1) What is the current or initial approach for SOC accounting for this project?
   3.2) How could SOC accounting be improved to help meet the project's finance goals and investors' needs?

4) Develop hybrid methods: direct measurements with modeling and remote sensing.
   4.1) Measurement: use for activity data and gap-filling; focus on few high-quality measurements.
   4.2) Modeling: identify model, calibration methods, technical requirements, and acceptable uncertainties,
   4.3) Remote sensing: Identify application and requirements,
   4.4) Co-benefits assessment: identify how to estimate water, biodiversity, soil health, or other benefits in tandem with SOC assessment.

5) Develop landscape-level accounting (e.g., aggregate across larger scales).

6) Ensure integrity by reducing the risk of impermanence or non-performance (i.e., designing feasible carbon credit discounts, buffer pools of carbon credits, and accounting at the landscape scale).

Final remarks and a way forward

The finance community needs a standardized and low-cost fit-for-purpose approach to SOC accounting that can encourage investment and evolve to be suitable for future carbon markets. Building a sequenced approach for improving SOC MRV means planning to increase accuracy and reduce the accounting system's uncertainties over time.

Developing low-cost SOC accounting involves i) focusing on a few high-quality direct measurements to reduce the uncertainty of models and ii) enhancing the capability of farmers and practitioners to collect farm-level activity data to inform monitoring and models. Adopting hybrid approaches seems to be the most cost-effective pathway that considers all stakeholders' needs.

Further reading

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Acknowledgements

The authors thank all panelists and participants of the Soil Carbon and Finance Webinar and Hackathon, whose presentations and views contributed to the contents this Info Note.

The information presented here is based on the webinar and hackathon "Enhancing investment in soil health and carbon storage: Frontiers for linking finance and carbon accounting" that took place in September 2020. The webinar and hackathon agenda, presentations and other resources can be found at: soilcarbon.weebly.com/
Webinar: https://youtu.be/sb0F4QgiLiI
Hackathon Day 1: https://youtu.be/sb0F4QgiLiI
Hackathon Day 2: https://youtu.be/TzBTOFoljxA

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Citation:
Costa C Jr., Dittmer K, Shelton S, Bossio D, Zinyengere N, Luu P, Heinz S, Egenolf K, Rowland B, Zuluaga A, Klemme J, Mealey T, Smith M, Wollenberg E. 2020. How soil carbon accounting can improve to support investment-oriented actions promoting soil carbon storage. CCAFS Info Note. Wageningen, The Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

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