Soil Organic Carbon Framework

Methodology webinar
22 April 2020

Agenda

Sarah Leugers, Director of Communications	Need and demand for soil organic carbon removals
Owen Hewlett, Chief Technical Officer	Overview to the Soil Organic Carbon Framework Methodology and differences from Scope 3 SOC reporting
Giancarlo Raschio, Senior Manager, Land Use	SOC Framework methodology • Applicability • Project boundaries • Quantification approaches + procedures

Q&A

Happy Earth Day!

Why Soil Organic Carbon?

Half of the topsoil on the planet has been lost in the last 150 years

- Compaction, nutrient degradation, and soil salinity
- Increased fertilizer pollution
- More desertification + flooding risk

Soils can sequester around in 20 billion metric tonnes in 25 years, more than 10% of anthropogenic emissions (FAO)

Beyond-climate SDG Benefits

- Increased yields
- Improved farmer livelihoods
- Reduced chemical pollution
- Ecosystem and biodiversity benefits

Why Soil Organic Carbon?

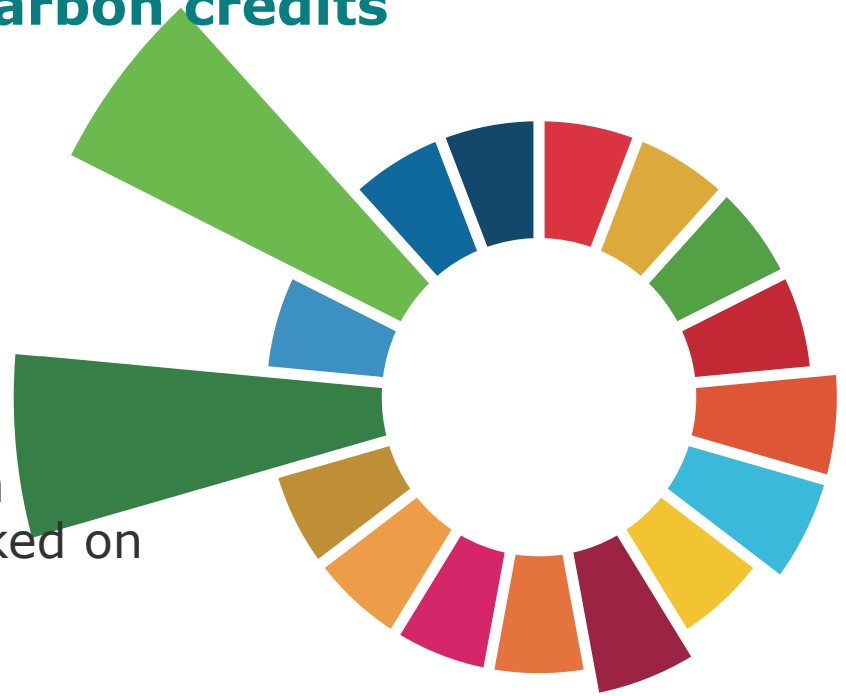
1. **Paris goal** to balance emissions with sinks by mid-century requires scale up of removals

2. Removals will play key role for corporates to close the gap towards **net-zero** under Science Based Targets initiative and/or claim climate positive benefits
   - Demand in 2019 for afforestation/reforestation (A/R) projects grew **342%** compared to that of 2016 (State of the Voluntary Carbon Markets 2019)

3. ICAO Technical Advisory Body prioritized emission removals methodologies for **CORSIA** eligibility (Not REDD+)

Why Gold Standard?

Gold Standard rigour → credibility + value for carbon credits



1. **Gold Standard quality requirements**:
   - Safeguards (eg, no land use change)
   - Stakeholder inclusivity
   - Additionality
   - Permanence
   - Leakage
   - Full independent third party validation + verification
   - Transparent outcomes logged and transactions tracked on public registry

2. **SDGs** fully verified and certified in one streamlined process with only one set of fees

Gold Standard®

Overview

Owen Hewlett, Chief Technical Officer

Soil Organic Carbon Framework Methodology Overview

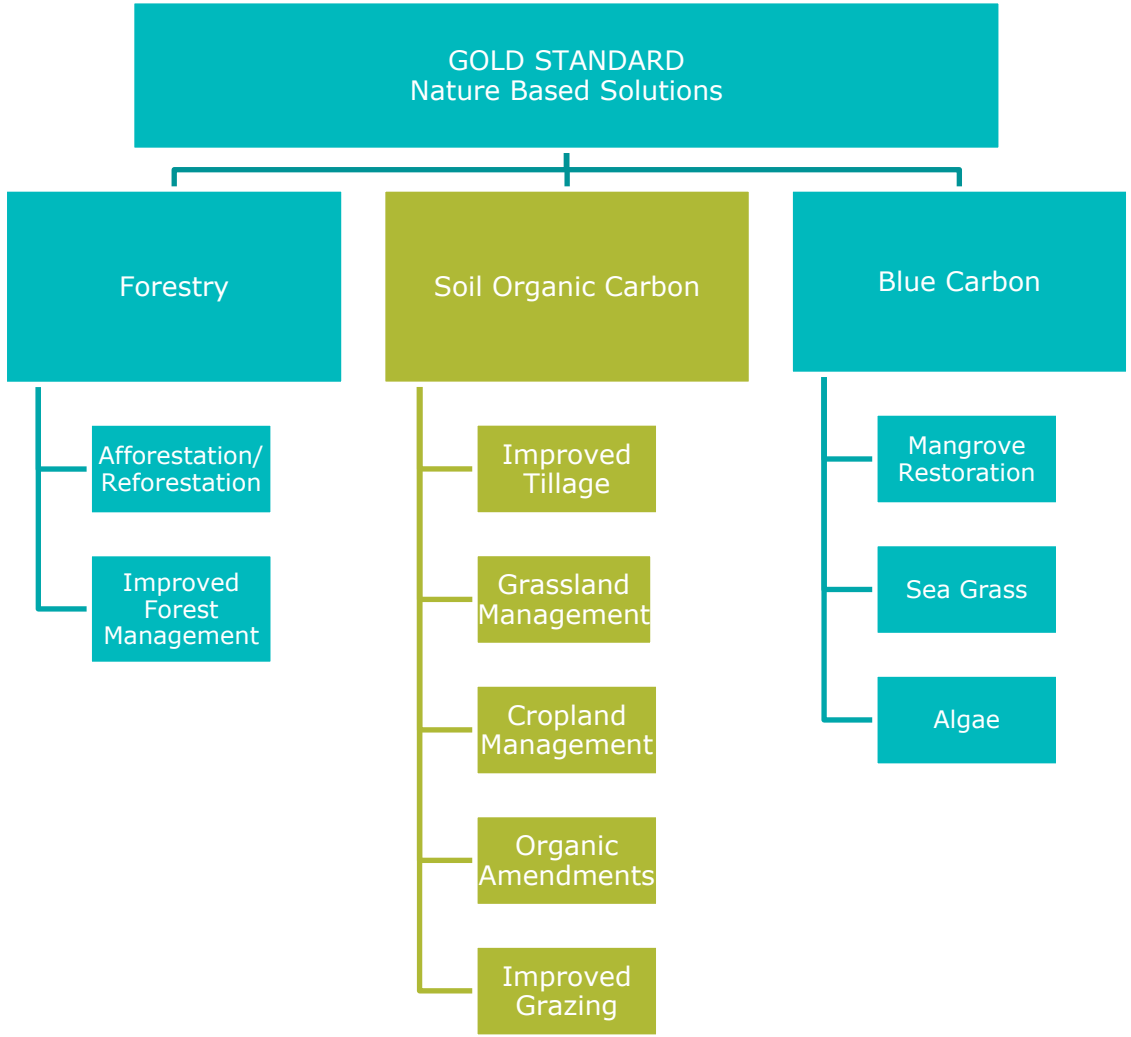
Enabling credible quantification SOC increases from improved agricultural practices for carbon markets

- **Broad applicability:** From small to large scale activities with efficient process to bring forward modules
- **Flexibility:**
  - **Approach 1**: Direct in-situ SOC measurements
  - **Approach 2**: Datasets and/or models from peer-reviewed publications to estimate baseline and project SOC stocks
  - **Approach 3**: Applies default IPCC factors to estimate SOC changes (Tier 2 preferred)
- **Credibility:**
  - Staggered deductions for uncertainty
  - Robust Technical Advisory Committee/expert oversight

Structure: Core framework + activity modules

- **Soil Organic Carbon Framework Methodology:**
  - Defines the requirements and guidance to ensure consistent quality across different SOC accrual activities
  - Sets the requirements for the development of Activity Modules

- **Activity Modules**
  - Project must have an approved Activity Module for its activity type



Activity Modules

- Activity-specific guidelines such as applicability, measurement and monitoring, scope of application (regional or global), data sources and/or model to apply, among others

SECTIONS	SOC FRAMEWORK METHODOLOGY	ACTIVITY MODULE
Applicability	• General applicability requirements	• Applicability requirements for specific activity, practices and/or quantification approaches (e.g. geographic limitations, additional requirements)
Crediting period	• Outlines general period of 5 to 20 years	• Provides detailed crediting period for the activity
Quantification approaches	• General outline of three quantification approaches	• Identifies the approaches applicable to the specific activity in the baseline and project scenarios
Project boundaries	• General guidelines	• Activity-specific criteria for the selection and justification of boundaries (spatial, temporal, carbon pools) criteria • Specific criteria for project area stratification (relevant subset and/or additions to framework criteria)

Carbon markets vs Value Change

SOC Framework (todays topic):

- **For carbon credit issuance:**
  - Fungible quantification and requirements such as impermanence, uncertainty, additionality
  - Issues carbon credits for use in general carbon markets and CORSIA (further requirements apply)
  - Intended for use in offsetting or contribution claims
- Full applicability – all requirements apply, this is not a pilot phase

≠

Currently separate programmes but may integrate post-pilot phase for VC

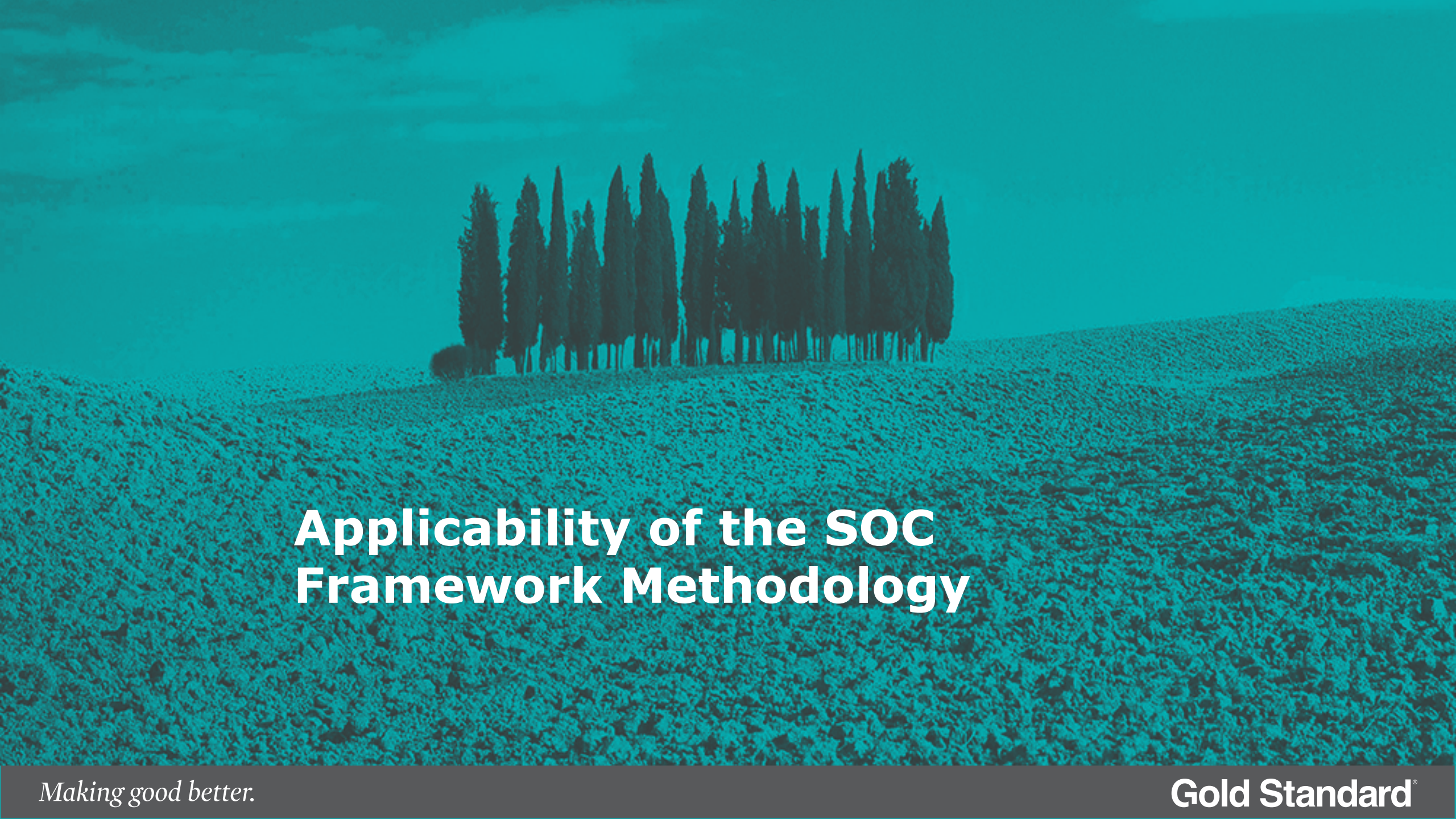
Value Change (not covered today):

- **For carbon company reporting:**
  - Follows separate requirements that are under development and testing
  - Issues statements to be used in the context of company reporting, no credits issued
  - Claims under development and review (e.g. Greenhouse Gas Protocol, Science Based Targets)
- Pilot applicability – in testing phase, entry is by application to SustainCERT and subject to ongoing review

Gold Standard®

SOC Framework methodology

Giancarlo Raschio, Senior Land Use Manager



Applicability of the SOC Framework Methodology

Applicability

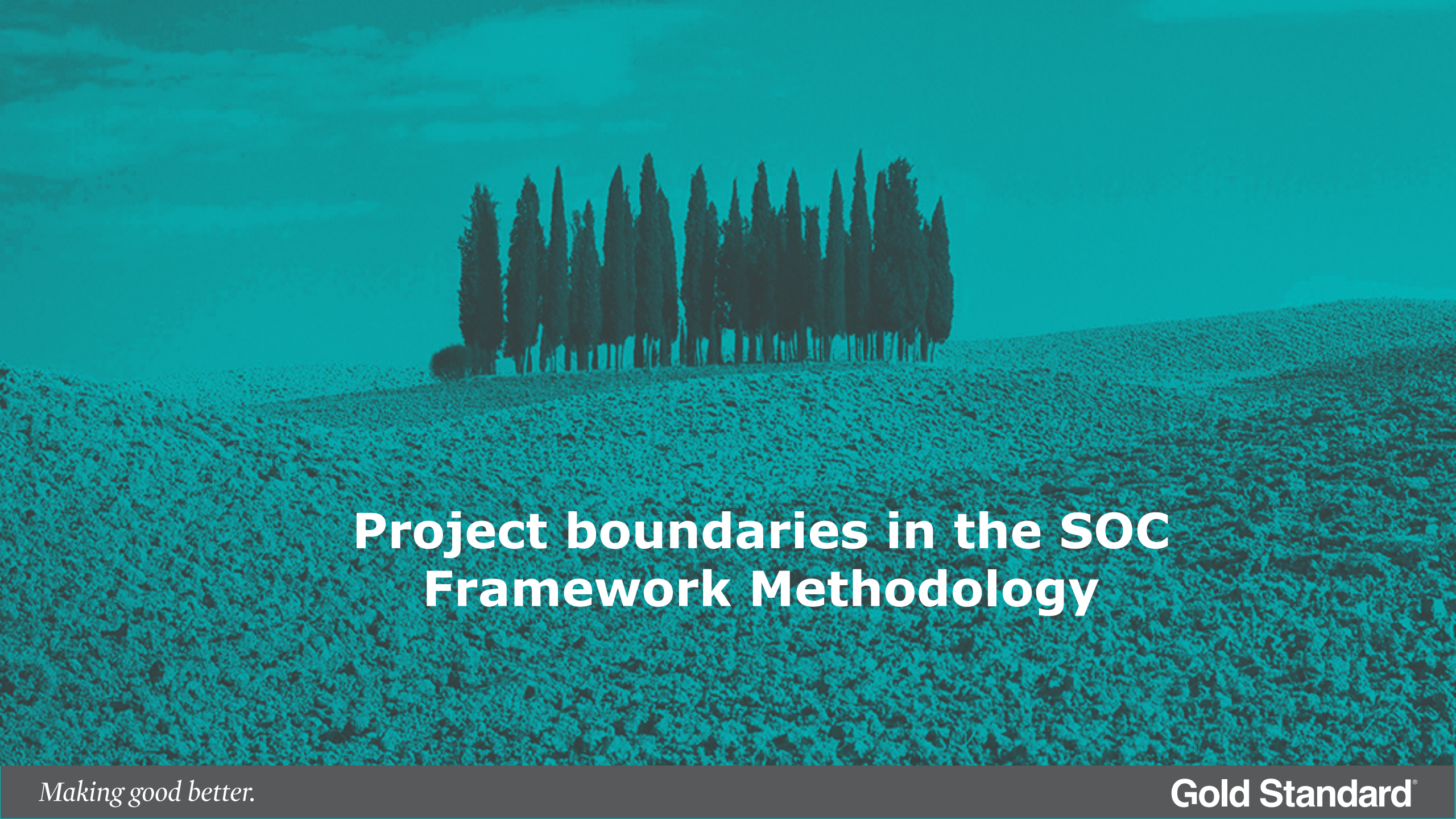
- No geographic restrictions

- Project area:
  - Cannot be on wetlands and/or forests (requirements from LUF Activity Requirements)
  - The project activity must take place on the same parcel of land as the baseline

- Site preparation:
  - Biomass burning is not allowed in the project scenario
  - Project activities shall not include changes in surface and shallow water regimes

Applicability (Safeguards)

- **Land use change**
  - The project activity shall not lead to land use change.
  - Managed cropping systems (e.g. single crop or crop rotation) must have been in place for at least 5 years prior to project implementation.
- **Food security**
  - No reduction in crop yield which can be attributed to the project activity.
  - Activities in the project area shall deliver a yield at least equivalent to the baseline 5-yr average yield.
  - If regional crop productivity changes (e.g. due to climatic factors), yield in project area shall not decrease significantly (5%) more than yield in the project region.



Project boundaries in the SOC Framework Methodology

Project boundaries

- **Spatial**
  - Includes activities that under the control of the project owner
  - Any areas leaving the project or those no longer included in monitoring during the crediting period shall be considered as full reversals (all accrued SOC must be assumed to be lost; refer to Performance Shortfall Guidelines for guidance on reversals).

- **Temporal**
  - The crediting period must be between 5-20 years and should be defined at the level of Activity Module.

Project boundaries (cont)

- **Carbon Pools**
  - Only SOC in both baseline and project scenario
  - Above-ground biomass shall be accounted for in the case there is risk of leakage in the case of activity shift

- **Greenhouse Gasses (GHG)**
  - All projects must monitor CO2
  - Methane (CH4) and nitrous oxide (N2O) may be required in the respective Activity Modules (e.g. due to risk of leakage or change in fertilization)
  - In principle, projects shall monitor all GHG sinks and sources affected by its activities. Omissions may be made if proven conservative

Quantification approaches for baseline and project scenarios

Quantification approaches

- General equation for the calculation of SOC accrual between two points in time:

$$\Delta C_{SOC,t-0} = (SOC_t - SOC_0) \times (1 - UD) \quad (2)$$

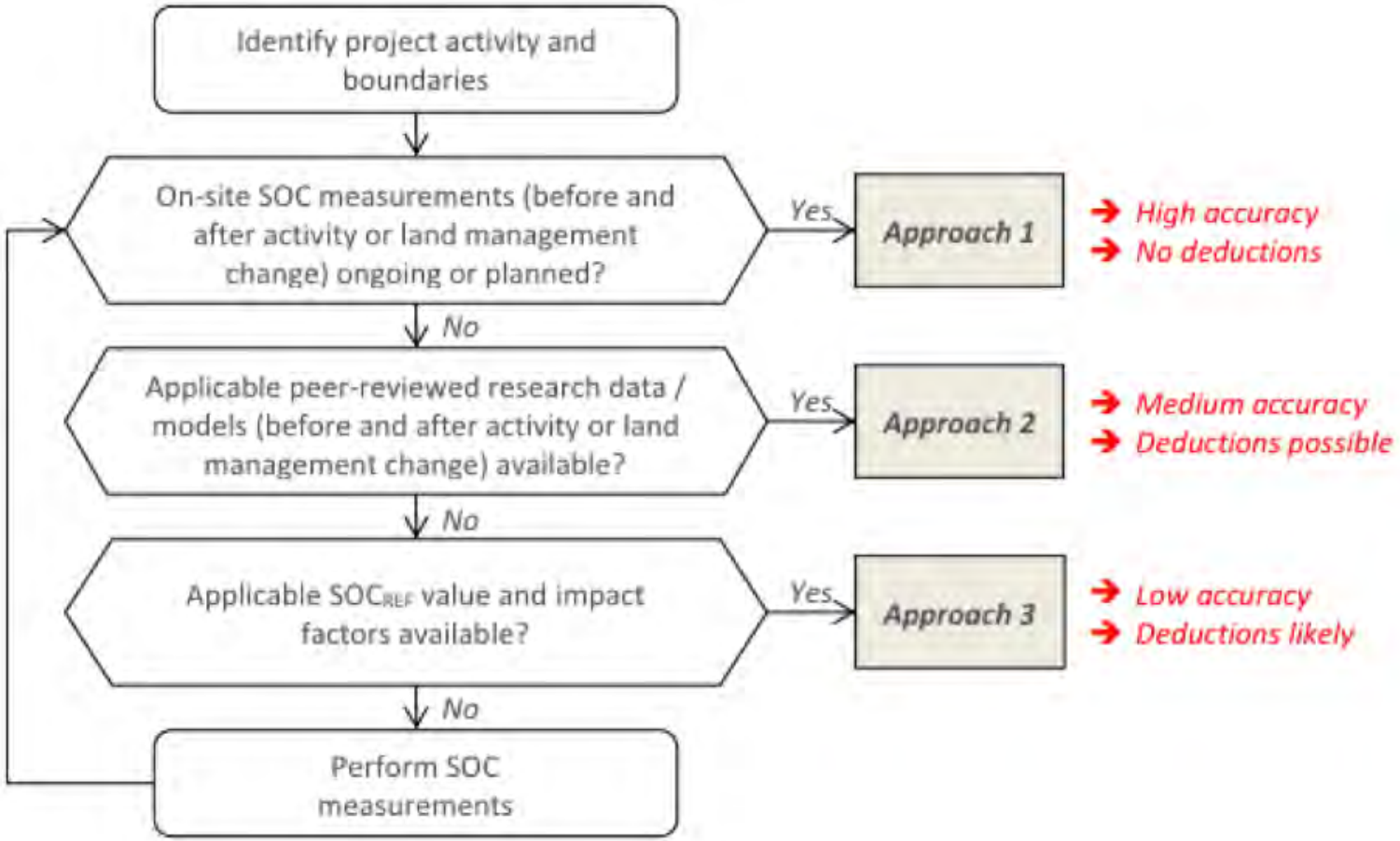
Where:

$\Delta C_{SOC,t-0}$	= change in soil organic carbon stocks in the calculation period [tC]
SOC_0	= soil organic carbon stock at the beginning of the calculation period [tC]
SOC_t	= soil organic carbon stock at the end of the calculation period [tC]
UD	= uncertainty deduction [dimensionless]

- Quantification approaches:
  - **Approach 1**(direct SOC measurements)
  - **Approach 2** (SOC estimated from peer-reviewed publications)
  - **Approach 3** (default IPCC 2019 factors)

- If a different approach is used for baseline and project scenarios in a stratum, conservativeness and comparability have to be ensured
- Activity modules must define which approaches are applicable for the respective SOC activity

Identification of appropriate calculation approach



Approach 1: Direct measurement

Direct measurement with enough number of samples to meet Gold Standard uncertainty requirements in each stratum (20% margin of error at 90% CL)

- Currently accepted protocols are the ICRAF protocol and the VCS SOC Module. Deviations from the protocols listed in the framework methodology or activity module (or use of alternate protocols) are subject to review and decision by The Gold Standard.

Approach 2: Data from peer-reviewed literature

SOC is derived from data published in **peer-reviewed literature** or accepted soil carbon **models**.

- Applicability of models to the project site must be provided and validated by a VVB (climate factors, soil and vegetation types, current and historic management systems)
- SOC values from literature may be verified by comparing them to measurements in a set of sample sites within the respective project stratum to indicate conservativeness of the parameter values applied

Approach 3: Default factors

SOC may be modelled using the approach documented in **IPCC 2019** Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use, Chapter 6 Grassland, table 6.2 (Updated).

- $$SOC_{BL,y} = SOC_{REF,y} \times \left(1 + \left(F_{LU,y} \times F_{MG,BL,y} \times F_{I,BL,y} - 1\right) \times \frac{T_{BL}}{D_{BL}}\right) \quad (4)$$

- $$SOC_{t,y} = SOC_{BL,y} + \Delta SOC_{t,y}$$
  $$\Delta SOC_{t,y} = SOC_{REF,y} \times F_{LU,y} \times \left(F_{MG,PR,y} \times F_{I,PR,y} - F_{MG,BL,y} \times F_{I,BL,y}\right) \times \frac{T_{PR}}{D_{PR}} \quad (6)$$

Procedures for approach change

Neutral change

- If SOC stocks measured (Approach 1) or calculated (Approach 2) at project start do not differ by more than 5% of the stocks calculated and verified with the previous approach for the baseline scenario
- If approach 1 or 2 are used for quantification, change to approach 3 is not allowed

Baseline scenario approach		Project scenario approach		Change rationale	Change rule	Change outcome	
Approach	SOC stock	Approach	SOC stock			Baseline value	Approach for project scenario
Appr. 3	55 ± 8%	App. 2	54 ± 4%	The project owner applies a specific SOC model for the practices under project scenario. This model is not applicable under the baseline scenario due to lack of historic data. A simpler model is used for the baseline calculations	Rule 2a): Difference is less than 5% change is neutral	54	Appr. 2

SOC change (modelled)

- If SOC stocks calculated with a new Approach 2 method differ by more than 5% from the stocks calculated and verified with the previous approach for the baseline scenario, the applicability of the selected dataset or model and parametrization shall be reviewed at project validation.
- If the new Appr. 2 is deemed applicable by the VVB, the baseline value shall be corrected accordingly.
- Exception: If the baseline stock was measured under Approach 1 and this baseline SOC value is higher than the new Approach 2 result, the measured baseline value shall remain to ensure conservativeness

Baseline scenario approach		Project scenario approach		Change rationale	Change rule	Change outcome	
Approach	SOC stock	Approach	SOC stock			Baseline value	Approach for project scenario
Appr. 2	37 ± 12%	App. 2	39 ± 5%	The project owner applies a specific SOC model for the practices under project scenario. This model is not applicable under the baseline scenario due to lack of historic data. A simpler model is used for the baseline calculations	Difference is less than 5% change is neutral	39	Appr. 2 (new model)

SOC change (measured)

- If SOC stocks measured with a new Approach 1 sample differ by more than 5% from the stocks calculated and verified with the previous approach for the baseline scenario, the baseline value shall be corrected accordingly.

Baseline scenario approach		Project scenario approach		Change rationale	Change rule	Change outcome	
Approach	SOC stock	Approach	SOC stock			Baseline value	Approach for project scenario
Appr. 3	82 ± 14%	App. 1	69 ± 9%	The project owner intends to perform measurements in the project area throughout the crediting period. However, such measurements are not available for the baseline period. Instead, a simple Approach 3 model was used for baseline calculations.	Measurements take precedence (even if difference is >5%)	69	Appr. 1

Uncertainty calculation and deduction

- The SOC Framework methodology provides guidance for the calculation of uncertainty using the upper-lower bound method

- Projects under the SOC Framework methodology shall follow the GS Uncertainty of LUF Parameters (LUF Activity Requirements Annex A) which require an uncertainty at the 20% margin of error at a 90% Confide Interval

- Uncertainties above 20% require a deduction:

LUF Uncertainty Requirements (20% margin of error at 90% CL)	
Uncertainty (U)	Uncertainty deduction (UD)
20 < U ≤ 30%	50%
30 <U ≤ 40%	75%
40 < U ≤ 50%	100%

Example:
Estimated mean = 60±30 kgCO2e
Calculate Uncertainty U = 30/60 = 50%
Resulting Uncertainty Deduction UD = 100% *30 = 30 kg CO2e

Other emissions

- Significant additional greenhouse gas emissions (>5% total) due to the project activity need to be accounted for. This explicitly includes emissions from increased fertilizer input and fossil fuel combustion. Activity Modules may define additional other emissions required.

- **Increased Nitrogen Fertilizer Input**
  - No differentiation is made between synthetic and organic N fertilizer.
  - Decreases in N fertilizer input in the project scenario cannot be accounted for unless this is an activity for which there is an Activity Module

- **Increased Combustion of Fossil Fuels and Electricity Use**
  - Additional CO2 emissions from use of fossil fuel and electricity in project activities need to be accounted for, unless project owner can demonstrate that fossil fuel/electricity used in the project scenario are less than or does not differ significantly from those in the baseline

- **Other Agrochemical Emissions**
  - Additional agrochemical emissions related to the project activities from increased use of agrochemicals, especially pesticides or non-N fertilizers need to be accounted for, unless the project owner can demonstrate that agrochemicals used in the project scenario are are less than or does not differ significantly from those in the baseline

Leakage

- Leakage is defined as an increase in GHG emissions outside the project area as a result of project activities. Activity Modules shall provide leakage calculations if applicable.

- The SOC Framework Methodology's applicability conditions do not allow yield reduction. For initial project calculations, leakage is thus considered equal 0.

- If a reduction in yield is detected in a performance certification, it is assumed that the lost production capacity will have to be made up for on land outside the project area. Emissions caused by such a shift must be accounted for as leakage, unless the project owner provides evidence that yield reductions are caused by factors unrelated to the project activity, e.g. regional yield reduction due to weather.

Double Counting and Benefits Overlap

- Benefits overlap from SOC increase from multiple SOC activities would occur when impacts of activities are not cumulative yet calculated through independent approaches.

- To avoid benefit overlap it is recommended to apply direct measurement (Approach).

- Approach 2 can be used but it is required a clear delineation of the boundaries of the impact generated by each activity.

Monitoring

- A project validation models should be corroborated with the data from temporary soil pits (50 x 50 cm).
- The number of pits used for this assessment shall represent the project situation and distributed across the defined strata.
- Soil pits must remain open after initial certification for VVB to confirm applicability of selected approaches.
- VVB shall revisit a series of soil pits to verify the project owner’s assessment. If applicability is in doubt, SOC measurement in a sub-sample is required.

Questions?

General questions – or activity module approval

giancarlo.raschio@goldstandard.org

help@goldstandard.org

Eligibility or clarification questions – or project certification

robin.duchesneau@sustain-cert.com

help@sustain-cert.com