Food and Agriculture Organization of the United Nations

GLOBAL SOIL PARTNERSHIP

RECSOIL Recarbonization of global agricultural soils (RECSOIL) and the GSOC-MRV Protocol

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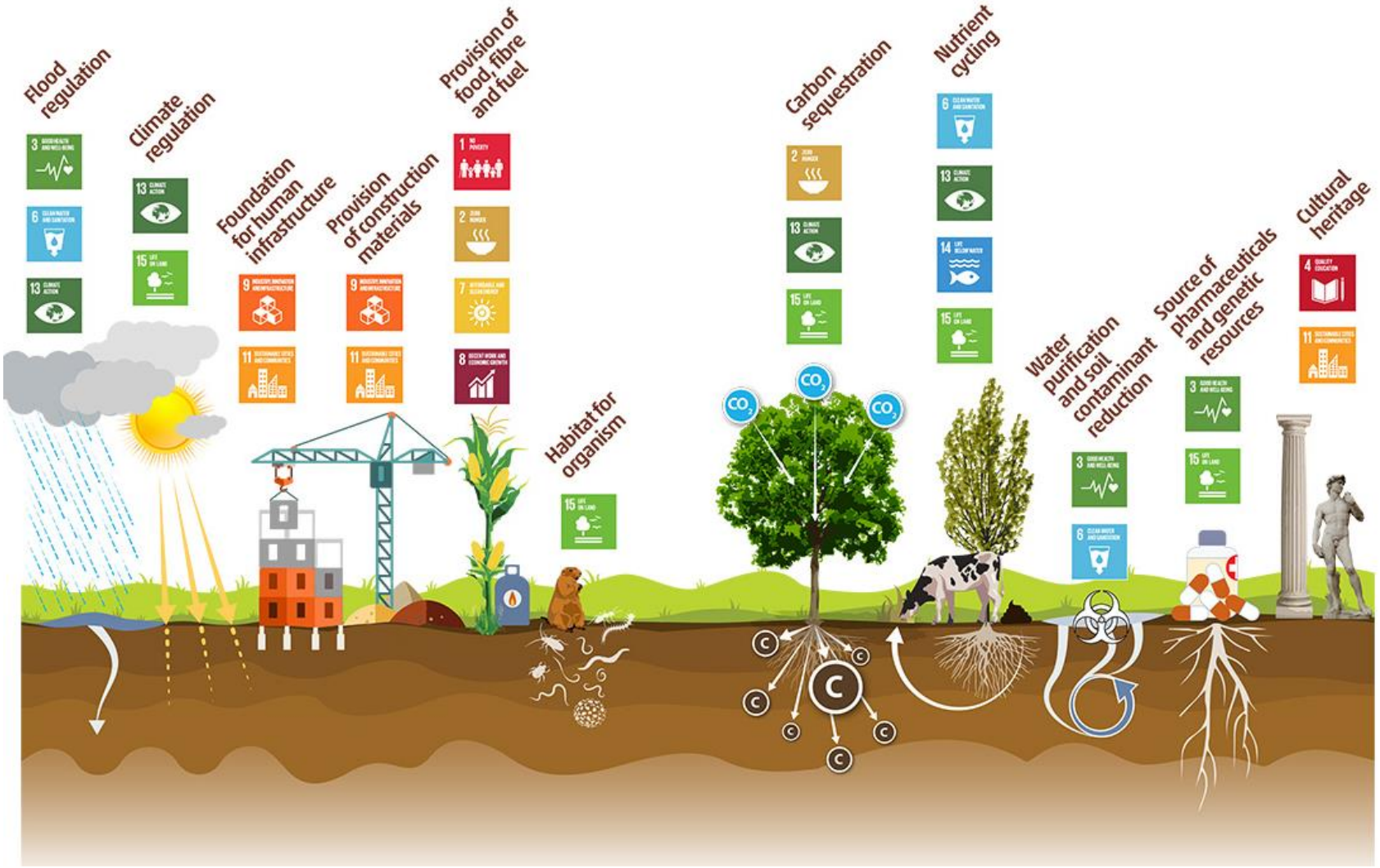
A healthy soil is capable of providing most terrestrial ecosystem services, therefore contributing to achieve the SDGs and human well-being



The current global challenges

United Nations Convention to Combat Desertification

Desertification, drought, Land degradation

Convention on Biological Diversity

Protecting, conserving, restoring Biodiversity

United Nations Framework Convention on Climate Change

Climate change – Mitigation and Adaptation

Food and Agriculture Organization of the United Nations

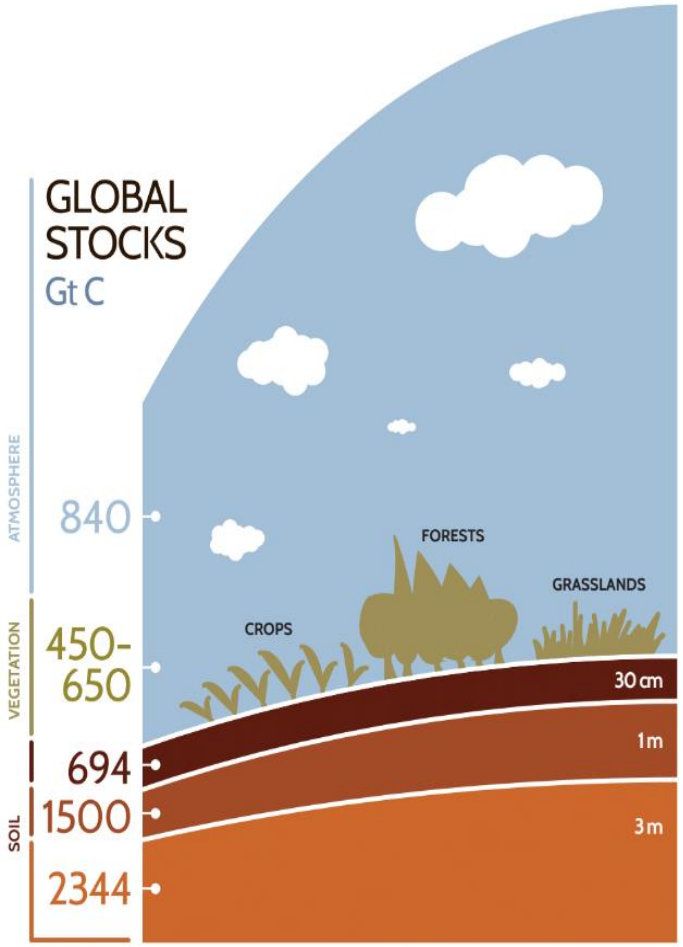
Food security and nutrition

Soil carbon, the heart of the soil

Healthy soils = SOC

SUSTAINABLE DEVELOPMENT GOALS

Carbon stock in soils is huge, but soil degradation is directly associated with SOC loss, hence EMMISIONS as CO_2 and N_2O



DEPLETION OF SOC IN WORLD SOILS

135 Gt C

Gt = gigatonne = 10^{15} g C = billion tonnes

Soils: one solution

Potential global contribution of response options to mitigation, adaptation, combating desertification and land degradation, and enhancing food security

Panel A shows response options that can be implemented without or with limited competition for land, including some that have the potential to reduce the demand for land. Co-benefits and adverse side effects are shown quantitatively based on the high end of the range of potentials assessed. Magnitudes of contributions are categorised using thresholds for positive or negative impacts. Letters within the cells indicate confidence in the magnitude of the impact relative to the thresholds used (see legend). Confidence in the direction of change is generally higher.

	Response options based on land management	Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Agriculture	Increased food productivity	L	M	L	M	H	
	Agro-forestry	M	M	M	M	L	●
	Improved cropland management	M	L	L	L	L	●●
	Improved livestock management	M	L	L	L	L	●●●
	Agricultural diversification	L	L	L	M	L	●
	Improved grazing land management	M	L	L	L	L	
	Integrated water management	L	L	L	L	L	●●
	Reduced grassland conversion to cropland	L		L	L	- L	●
Forests	Forest management	M	L	L	L	L	●●
	Reduced deforestation and forest degradation	H	L	L	L	L	●●
Soils	Increased soil organic carbon content	H	L	M	M	L	●●
	Reduced soil erosion	⟷ L	L	M	M	L	●●
	Reduced soil salinization		L	L	L	L	●●
	Reduced soil compaction		L		L	L	●
Other ecosystems	Fire management	M	M	M	M	L	●
	Reduced landslides and natural hazards	L	L	L	L	L	
	Reduced pollution including acidification	⟷ M	M	L	L	L	
	Restoration & reduced conversion of coastal wetlands	M	L	M	M	⟷ L	
	Restoration & reduced conversion of peatlands	M		na	M	- L	●
	Response options based on value chain management						
Demand	Reduced post-harvest losses	H	M	L	L	H	
	Dietary change	H		L	H	H	
	Reduced food waste (consumer or retailer)	H		L	M	M	
Supply	Sustainable sourcing		L		L	L	
	Improved food processing and retailing	L	L			L	
	Improved energy use in food systems	L	L			L	
	Response options based on risk management						
Risk	Livelihood diversification		L		L	L	
	Management of urban sprawl		L	L	M	L	
	Risk sharing instruments	⟷ L	L		⟷ L	L	●●

Options shown are those for which data are available to assess global potential for three or more land challenges.
The magnitudes are assessed independently for each option and are not additive.

Key for criteria used to define magnitude of impact of each integrated response option

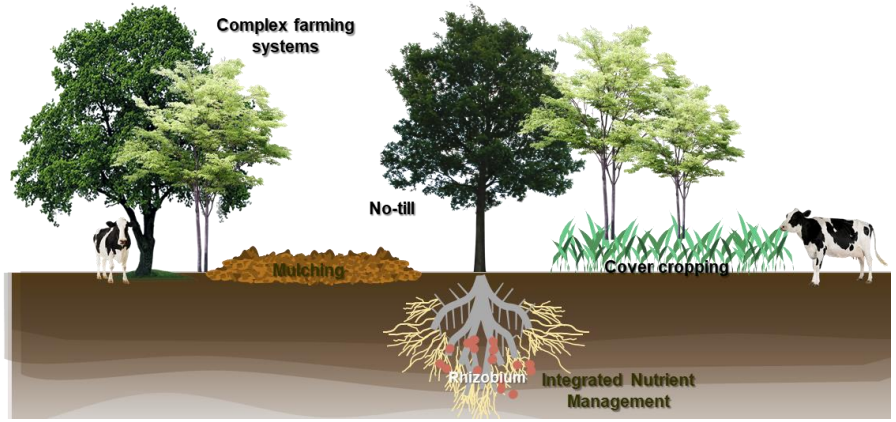
		Mitigation *Gt CO_2-eq yr^{-1}*	Adaptation *Million people*	Desertification *Million km^2*	Land Degradation *Million km^2*	Food Security *Million people*
Positive	Large	More than 3	Positive for more than 25	Positive for more than 3	Positive for more than 3	Positive for more than 100
	Moderate	0.3 to 3	1 to 25	0.5 to 3	0.5 to 3	1 to 100
	Small	Less than 0.3	Less than 1	Less than 0.5	Less than 0.5	Less than 1
	Negligible	No effect	No effect	No effect	No effect	No effect
Negative	Small	Less than -0.3	Less than 1	Less than 0.5	Less than 0.5	Less than 1
	Moderate	-0.3 to -3	1 to 25	0.5 to 3	0.5 to 3	1 to 100
	Large	More than -3	Negative for more than 25	Negative for more than 3	Negative for more than 3	Negative for more than 100

⟷ **Variable**: Can be positive or negative — no data — na not applicable

Confidence level
Indicates confidence in the estimate of magnitude category.
H High confidence
M Medium confidence
L Low confidence

Cost range
See technical caption for cost ranges in US$ tCO_2e^{-1} or US$ ha^{-1}.
●●● High cost
●● Medium cost
● Low cost
— no data

Scaling-up sustainable soil management practices based on SOC sequestration



- Uncertainty about additionally and permanence.
- Measuring SOC: not an easy and cheap task, accuracy.
- Unavailable harmonized SOC MRV Protocol at farm level.
- Recognizing farmers as the main vehicle of change.
- Lack of financial incentives for implementing Good practices.
- Lack of technical support to farmers.
- Long-term investment.
- SOC sequestration not at scale yet.
- Focusing on SOC only, and not on Soils as provider of Ecosystem Services.
- We forget about Nitrogen and methane

MULTIPLE BENEFITS OF SUSTAINABLE SOIL MANAGEMENT AND SOC SEQUESTRATION

Food security and nutrition

- Enhance productivity and yields
- Enhance fertility
- Enhance quantity and nutritional quality of food
- Enhance farm income

Ecosystems services

- Water retention
- Erosion prevention
- Maintenance of soil fertility
- Filtration and denaturing of pollutants
- Nutrient cycling
- Moderation of climate
- Increase activity and species diversity of soil biota

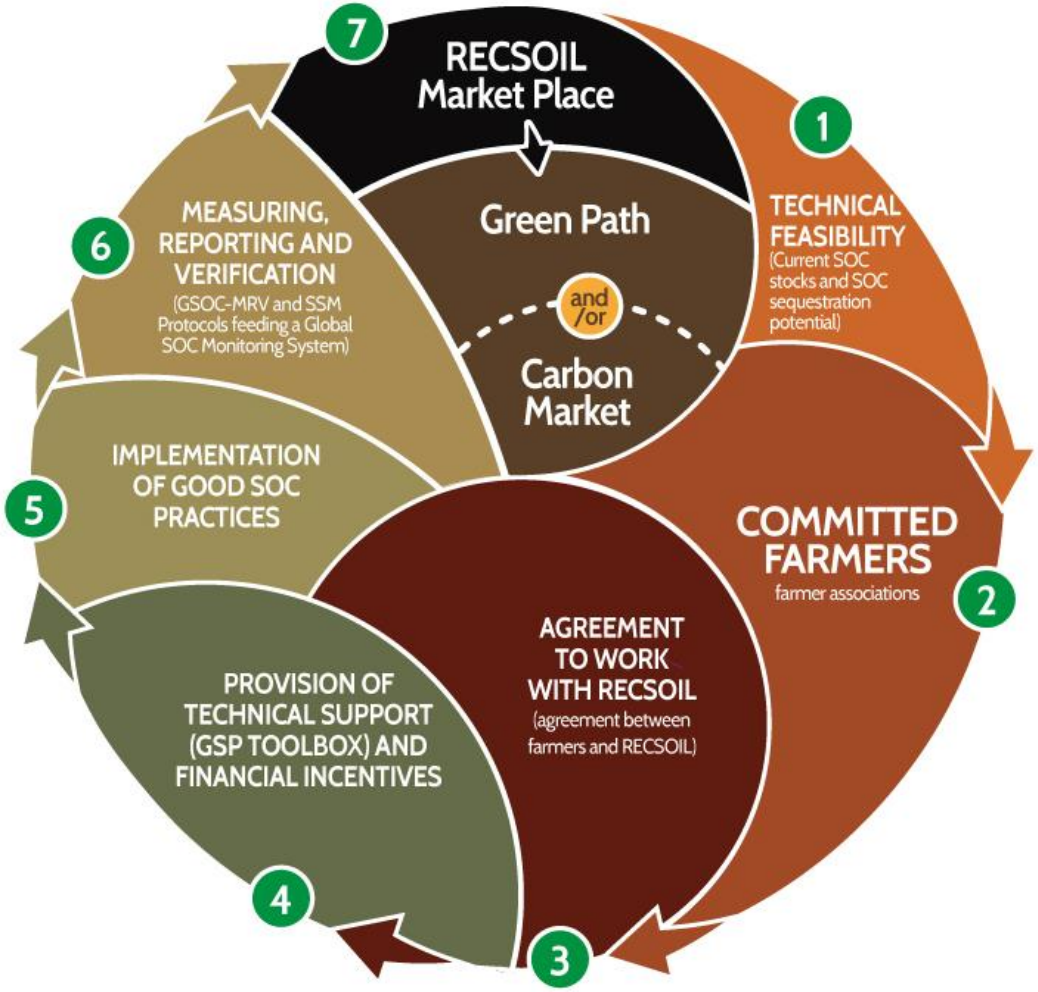
Sustainable development

- SDGs 1,2,3,6,12,13,15

Climate change adaptation and mitigation

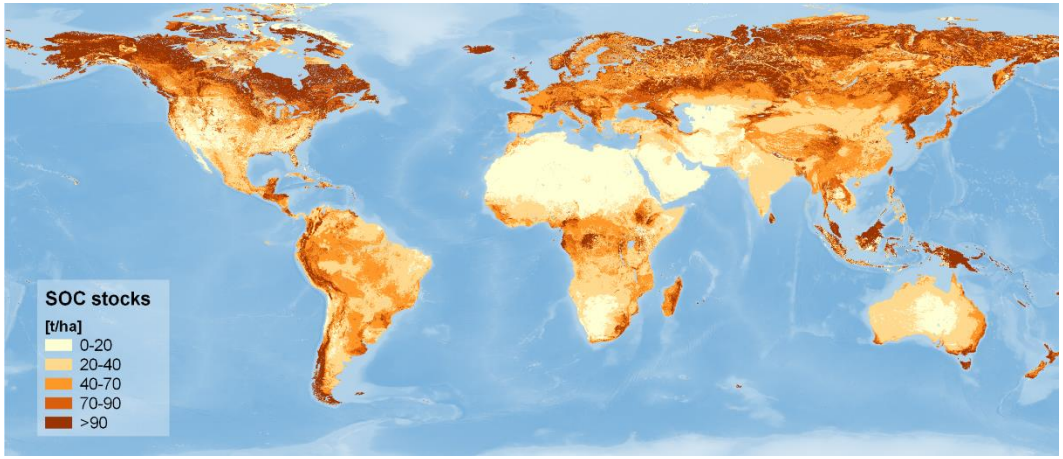
- Increase resilience to drougths and floods
- GHG's balance
- Contribute to reduce global warming
- Climate resilience of agroecosystems and farmers' livelihoods

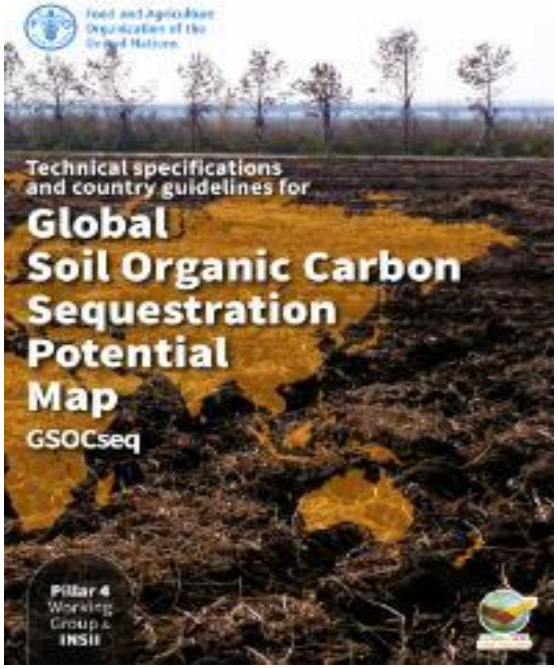
RECARBONIZATION OF GLOBAL SOILS



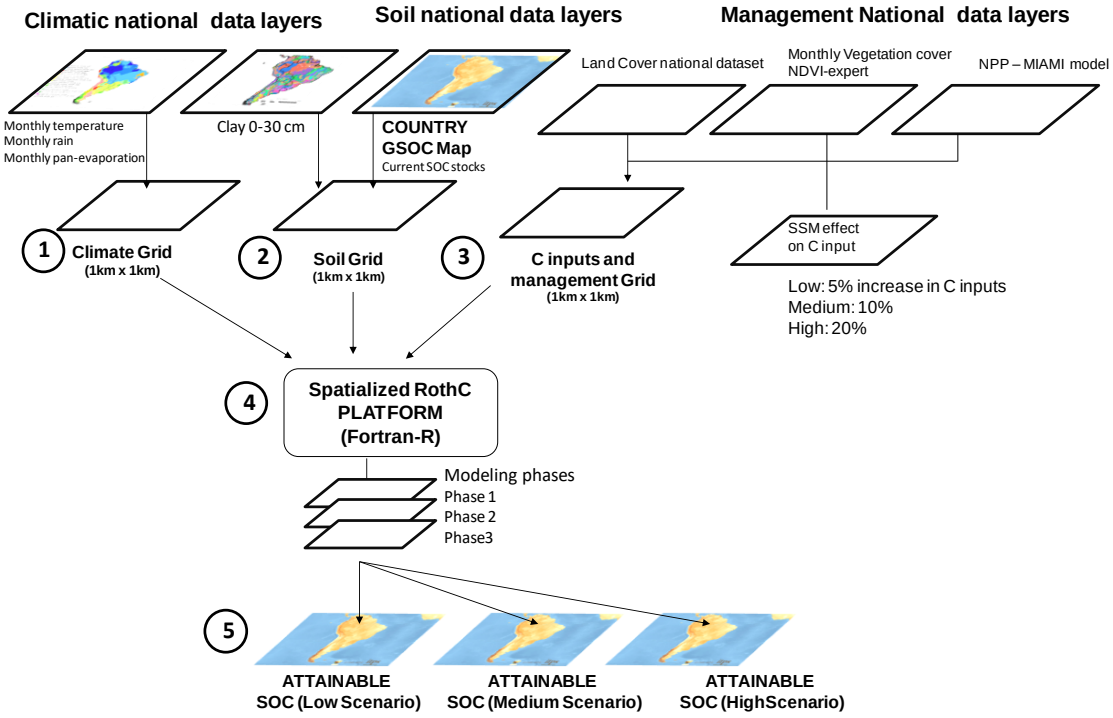
Technical feasibility (current stocks-potential)

GSOCmap – current stocks

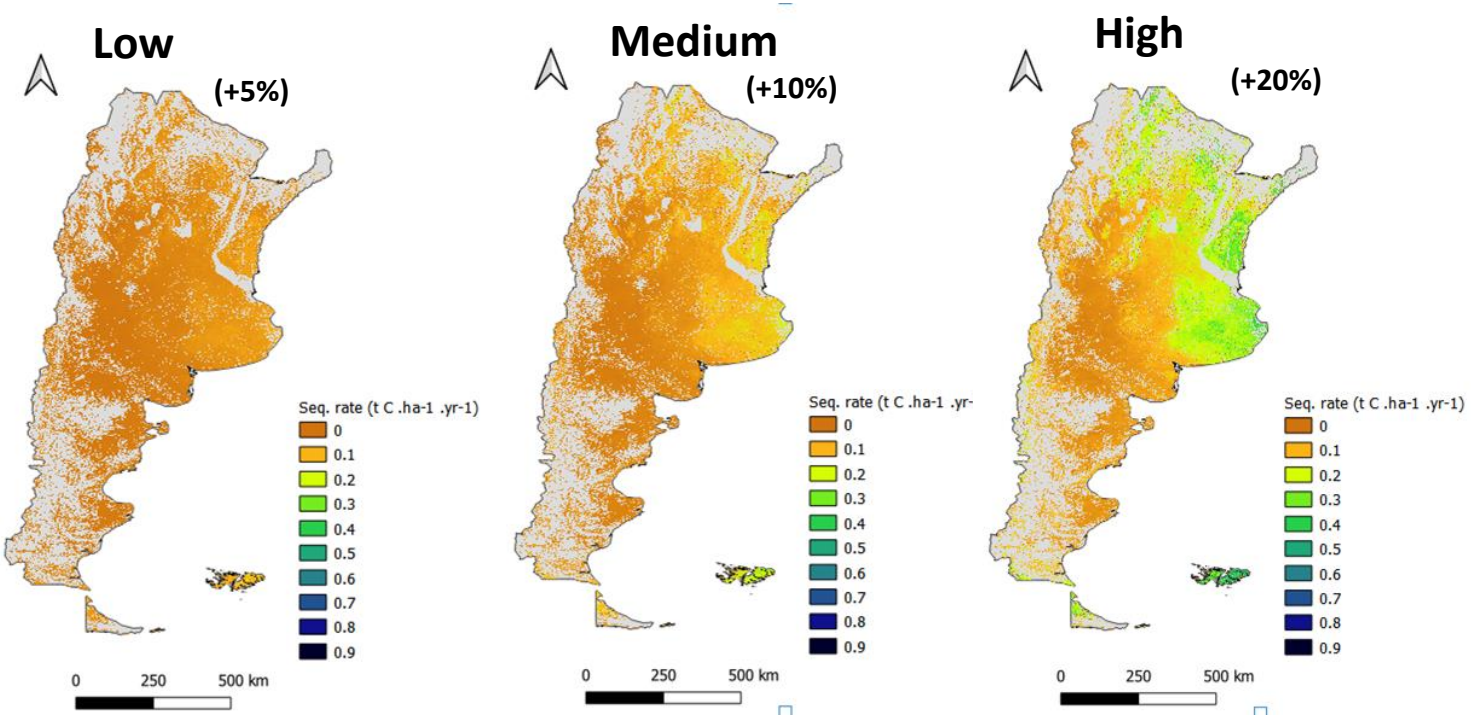


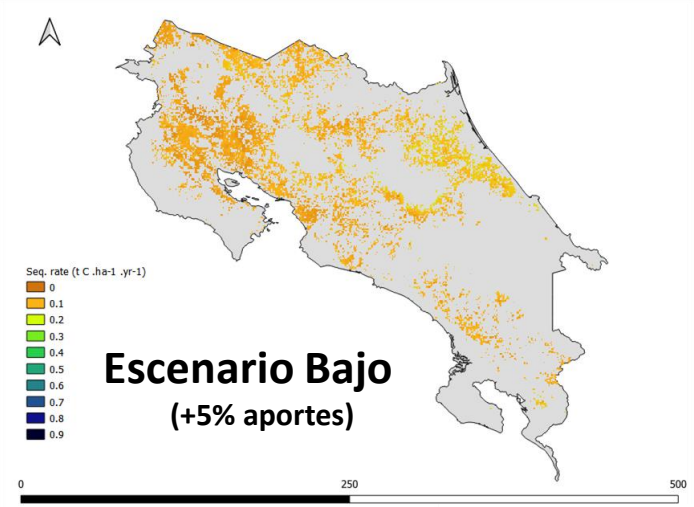


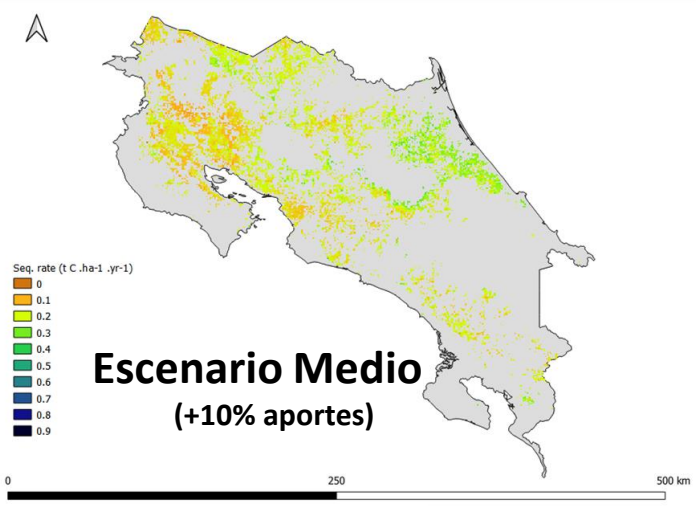
Global Soil Organic Carbon Sequestration Potential Map (GSOCseq map)

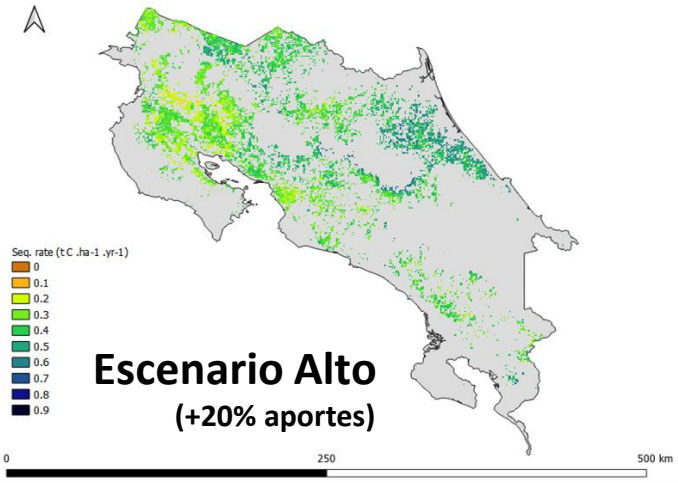


Standard Scenarios



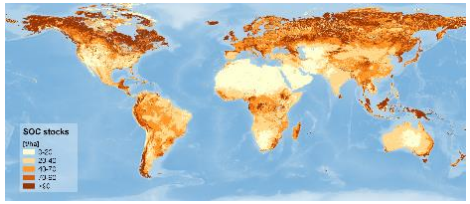

Seq. rate (t C .ha-1 .yr-1)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Escenario Bajo
(+5% aportes)
0
250
500


Seq. rate (t C .ha-1 .yr-1)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Escenario Medio
(+10% aportes)
0
250
500 km

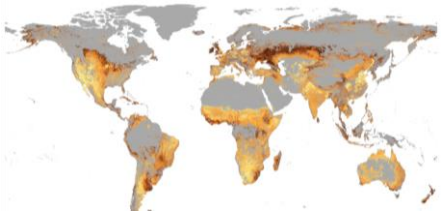

Seq. rate (t C .ha-1 .yr-1)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Escenario Alto
(+20% aportes)
0
250
500 km

Agreement to work with RECSOIL/ access to RECSOIL toolkit

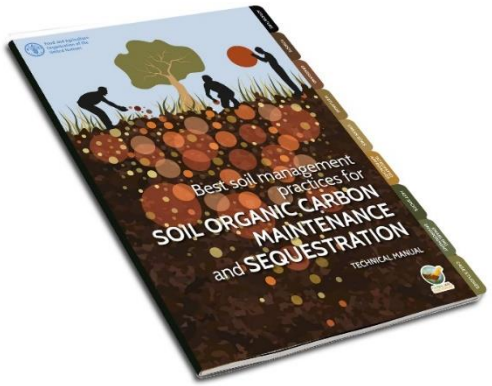
Written Agreement between individual farmers or farmer associations to implement RECSOIL (access to technical support and financial incentives)



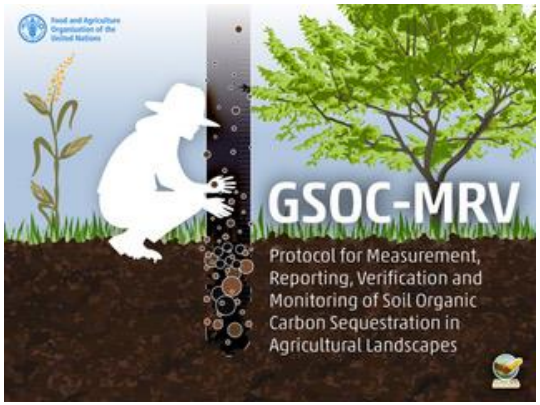
GSOC map
GSOCseq map



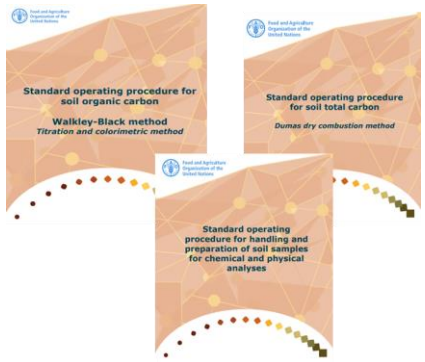
Global SOC Monitoring System



Manual of good practices



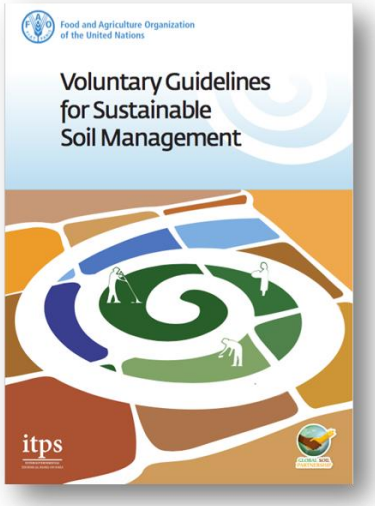
GSOC-MRV Protocol

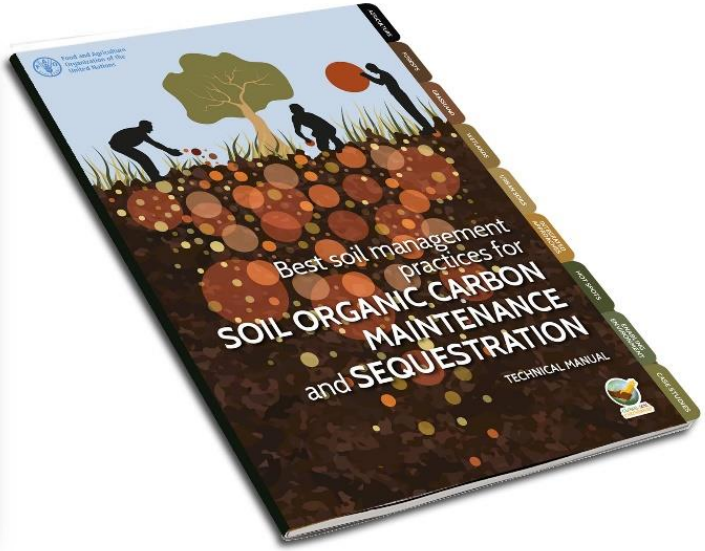


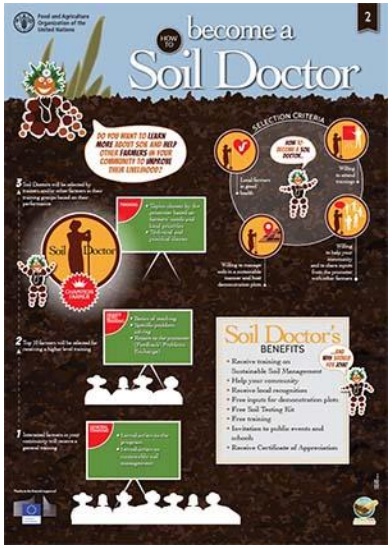
SOPs for soil organic carbon

VGSSM + SSM Protocol

Implementation of Good SOC Practices (technical support and financial incentives)







- According to the local context, **selection of the good practices**.
- **Technical support for the implementation of the good practices** on the ground.
- **Financial incentives** (3 payments, establishment, after 4 years and at year 8).
- **Continuous support and monitoring.**
- **Soil Doctors** for farmers.

Recarbonization of global soils: *A technical manual of best management practices*

WHAT ?

A peer-reviewed meta-analysis of the main **hot spots of SOC, SSM practices and farming approaches**

WHERE ?

In all landscapes : Croplands, Grasslands, Wetlands, Forests, Urban areas

HOW ?

Presented as **factsheets**

HOT SPOTS	PRACTICES AND APPROACHES
Description and importance of the hot-spot Geographical repartition SOC stocks (quantitative) Provision services associated GHG emissions and climate change impact Challenges and trends	Description of the practice Geographical application Potential for SOC sequestration (quantitative) Provision services associated Socio-economic benefits GHG emissions and climate change impact Points of attention to facilitate implementation

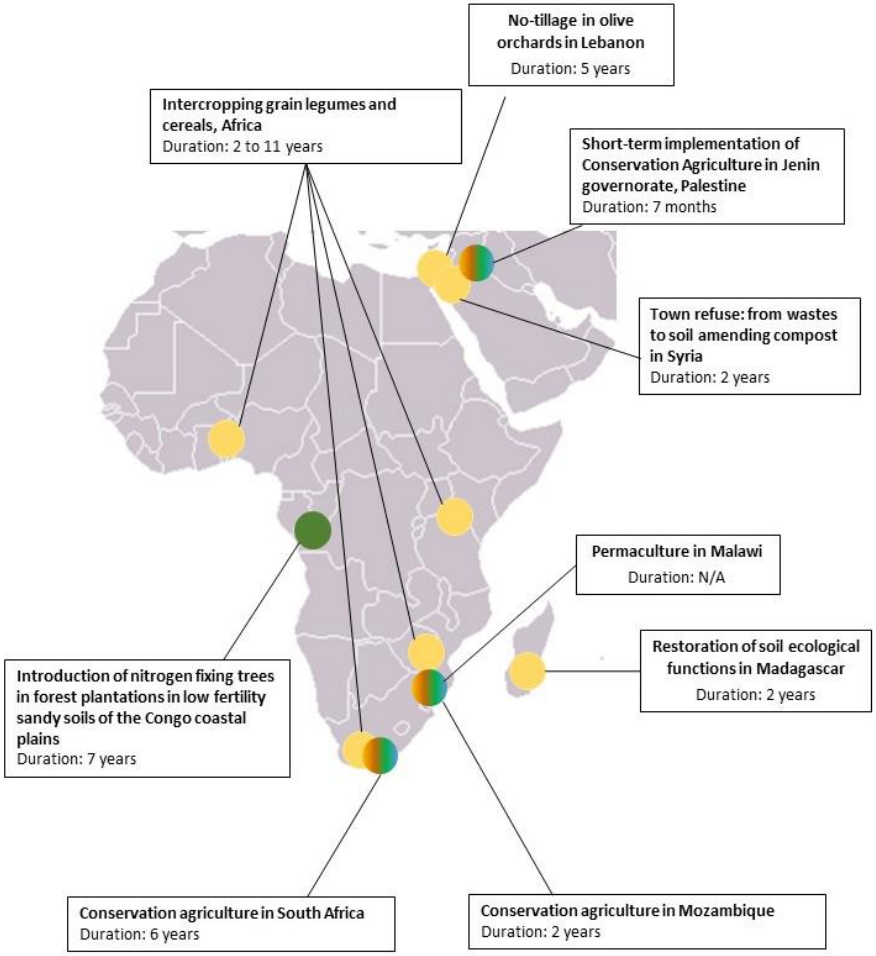
+ Complemented by **case-studies** of practical applications of these SSM practices

BY WHO ?

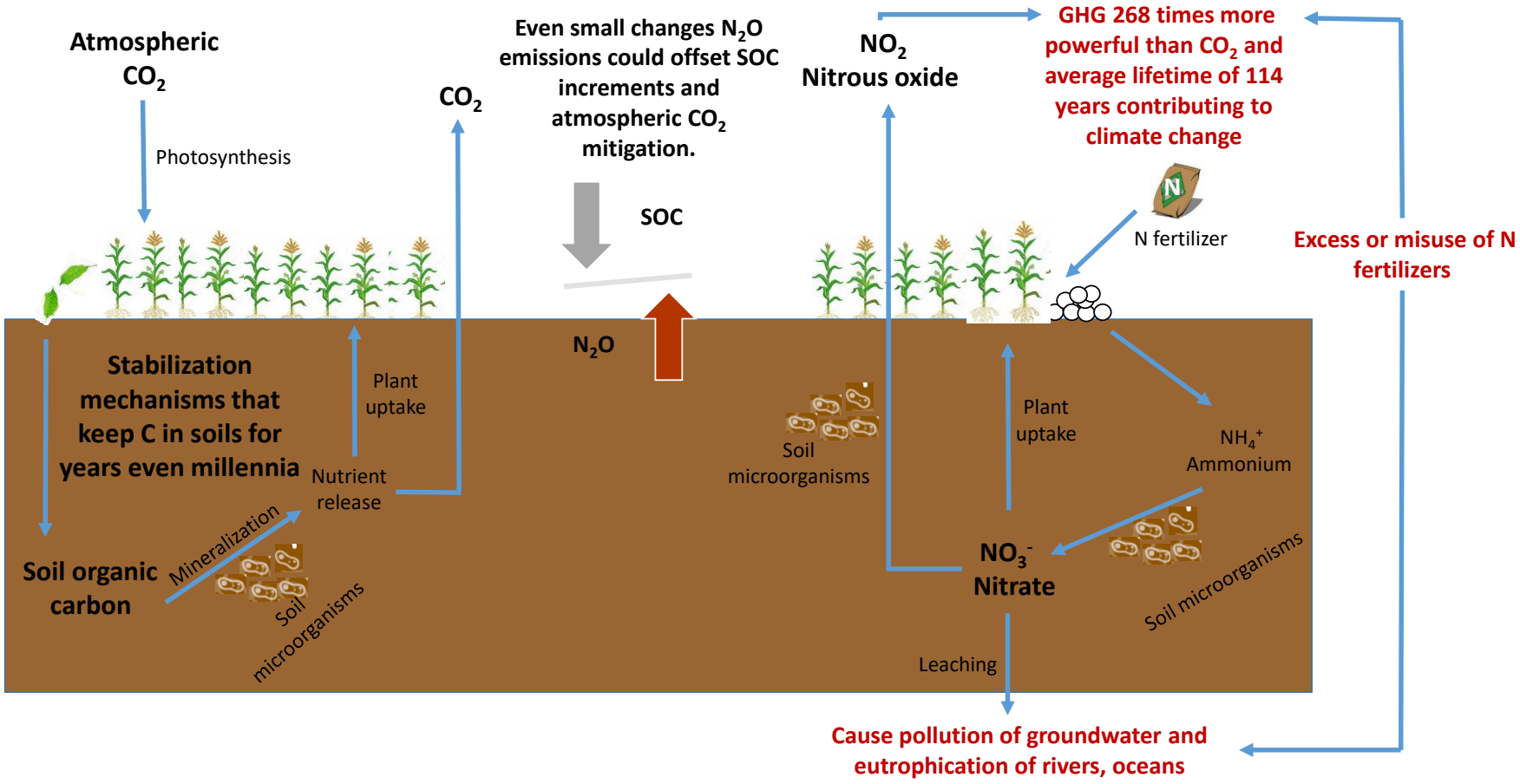
+370 experts

Recarbonization of global soils: *A technical manual of best management practices*

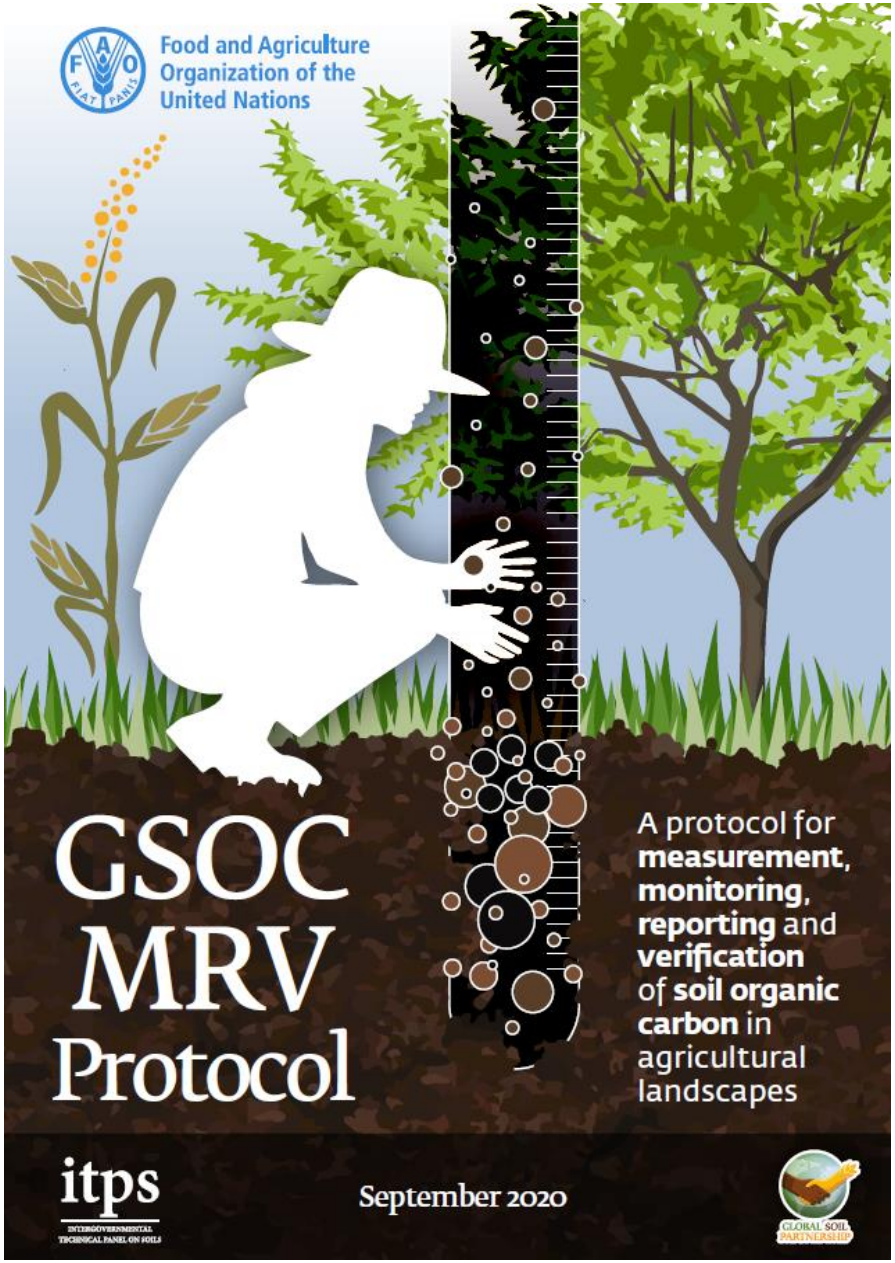
Examples of case-studies for Africa and the NENA



The Nitrogen problem

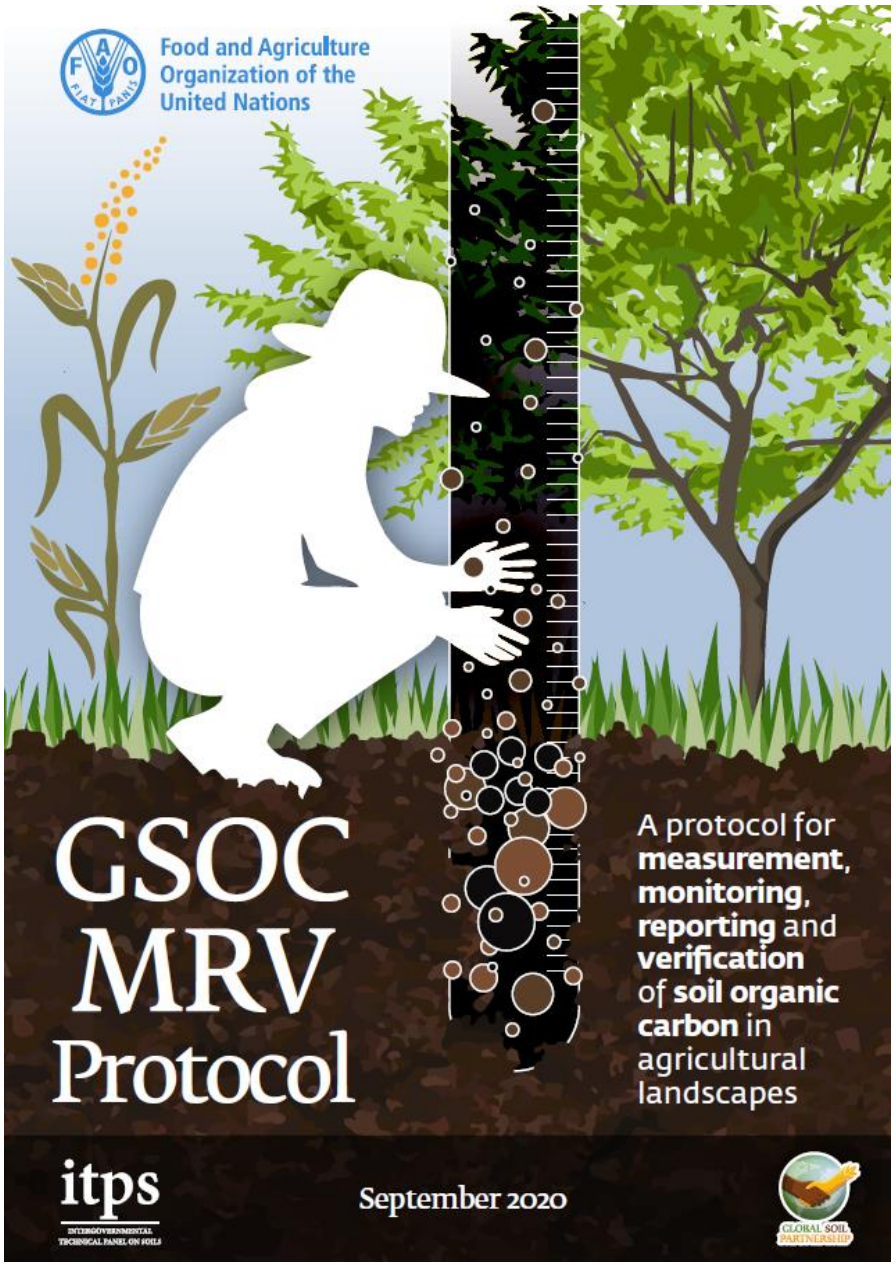


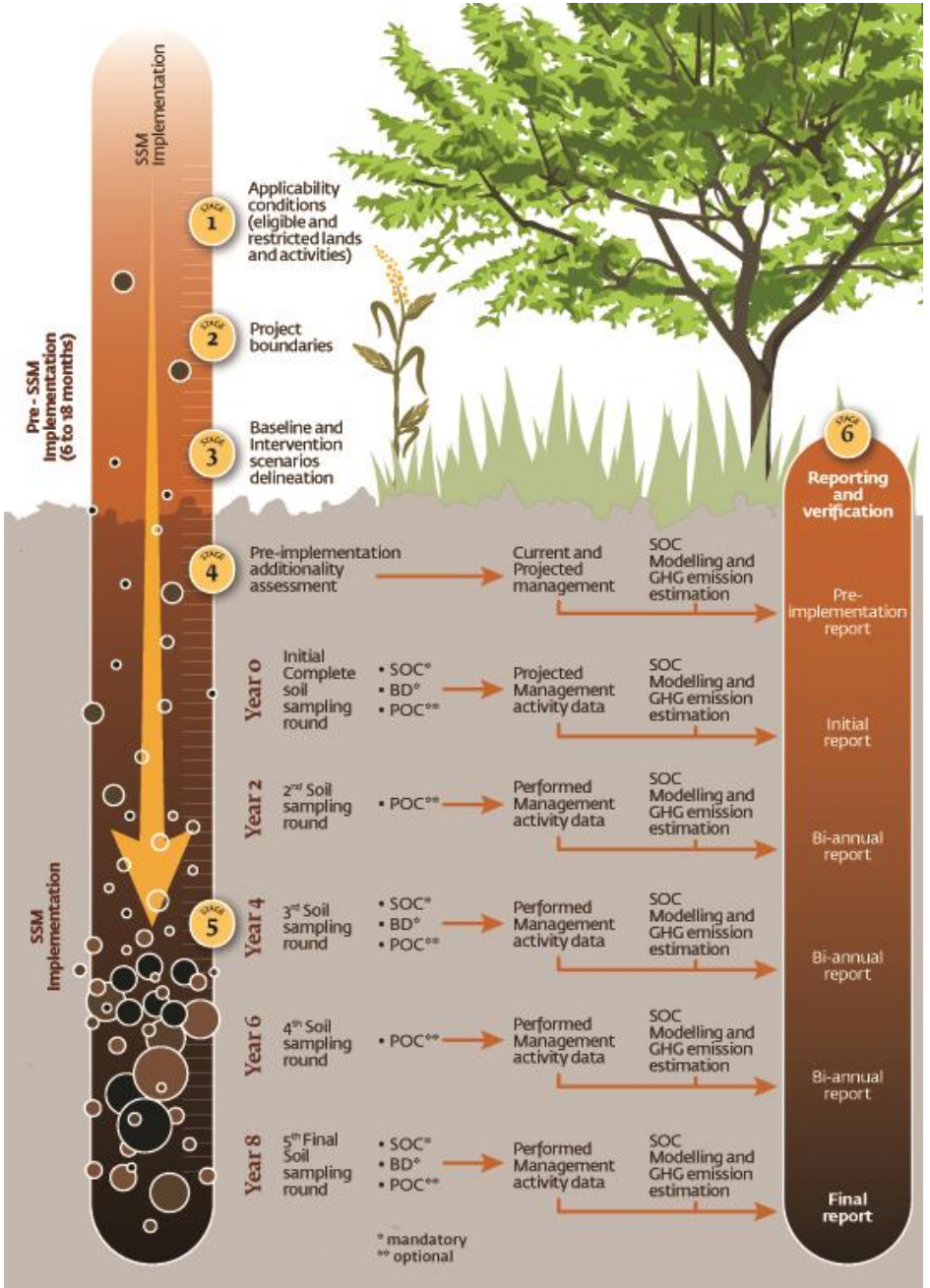
Measuring, monitoring, reporting and verification



- **Measurement of Baseline at farm level** (before good practices are implemented).
- **Second measurement:** after 4 years of implementation, measurement of additionally of SOC and ecosystem services.
- **Final measurement:** at 8 years of implementation (reporting of SOC seq. and multiple ecosystem services achieved).
- **Verification by VVBs**.
- Intermediate measurements to demonstrate change, can be alternatively done using POM.
- All data feeding the **Global SOC Monitor System**.

Measuring, monitoring, reporting and verification

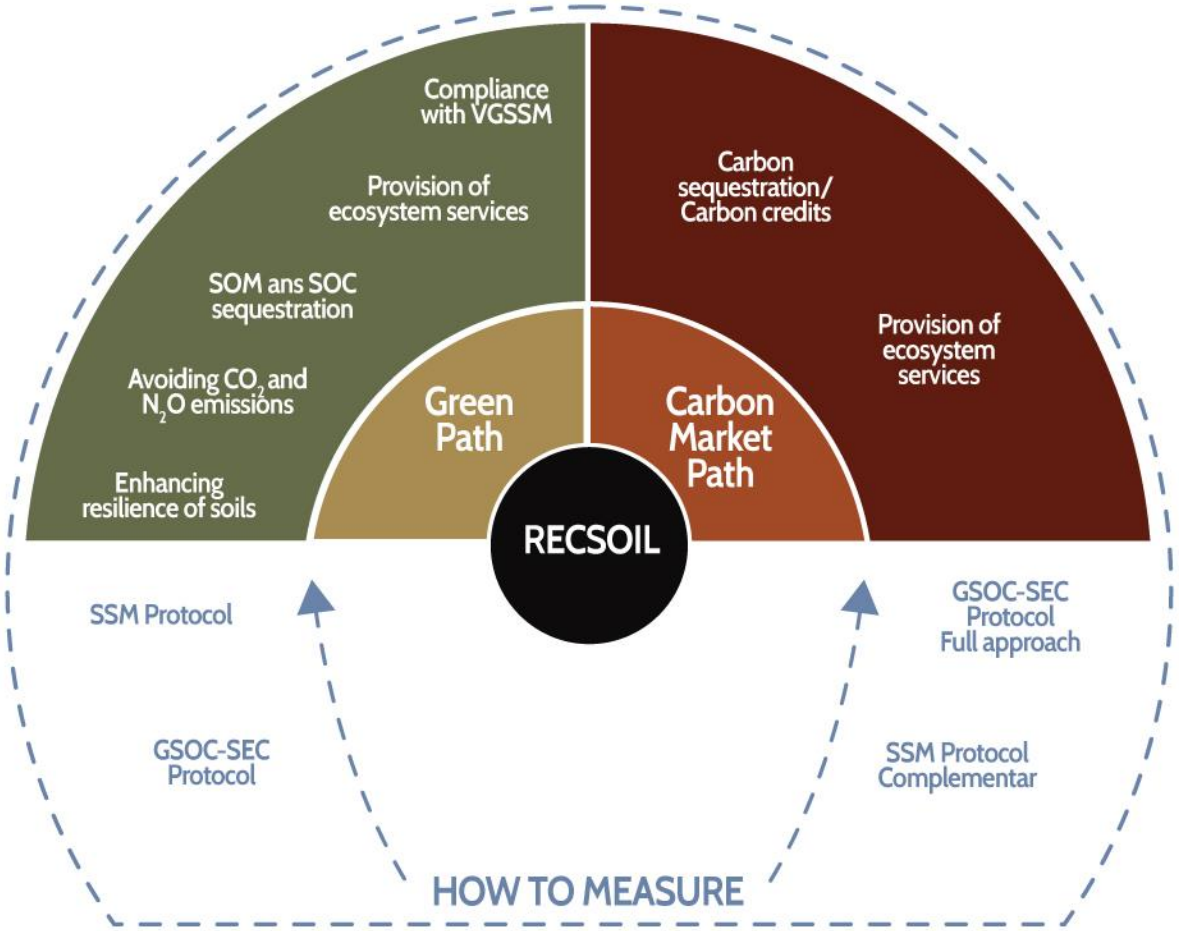




Measuring, monitoring, reporting and verification

Indicator	Proposed Parameter/ metric	Laboratory methods	Sample characteristics
Soil productivity	Agricultural productivity or biomass (t ha^{-1})	Dry weight of vegetation quadrats, or yield measurements	Quadrat method or yield measurement
Soil organic carbon	% organic carbon	Walkley- Black method http://www.fao.org/3/ca7471en/CA7471EN.pdf	Representative soil sample (200 g)
Soil physical properties	Bulk density	Bulk density (kg dm^{-3})	Undisturbed representative sample with known volume
Soil biological activity	Soil respiration rate (gCO_2 m^{-2} d^{-1})	Soil respiration in dynamic closed chambers method (DC-method).	Representative soil sample (200 g).

RECSOIL MARKET PLACE



Important messages

- **Climate change**: an opportunity for scaling up sustainable soil management.
- While the centre is **SOC**, we should not forget that our efforts should be **Soil Health**. Sustainable Soil Management for **Multiple benefits**.
- Many initiatives (**SOC Race**): but we need to balance (demand for **cheap carbon credits vs ethics**/offsseting emissions and **real costs** for making a change.
- **MRV**: its use is **flexible** and varies according to the **objective and use** (green path or carbon market).
- **Farmers at the center**: start from local knowledge, value chains, gender, youth as transversal considerations.

Food and Agriculture Organization of the United Nations

THANK YOU FOR YOUR ATTENTION!

For more information, please contact

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