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PRECISION CROP NUTRITION



Global Soil Doctors Programme

Carolina Olivera

CPCN seminars, April 5, 2023





What is it?

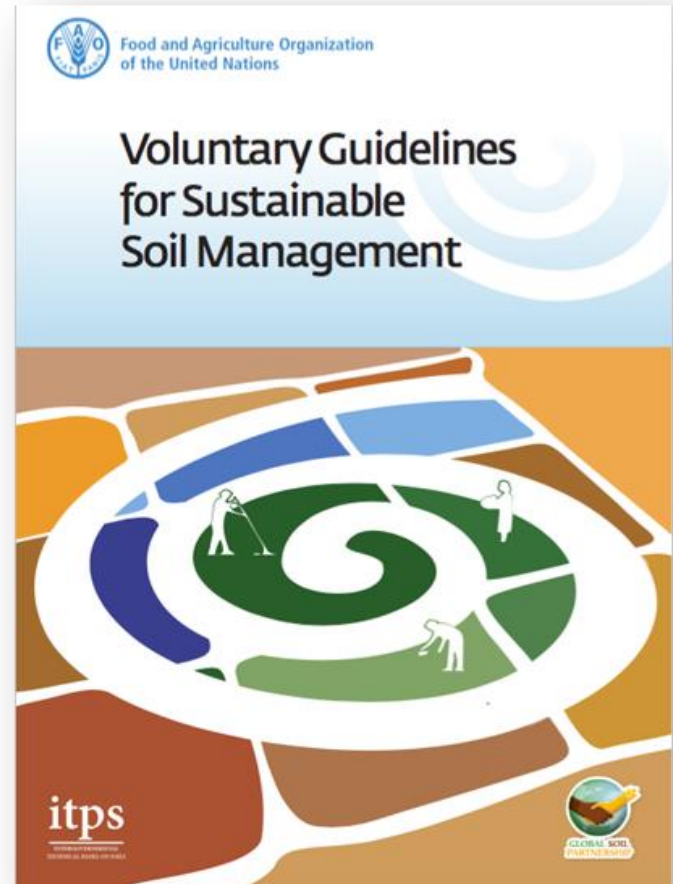
- Farmer-to-farmer training programme

Aim

- Building the capacity of farmers on soils and sustainable soil management;

Perspectives

- To support a self-sufficient system that will promote good practices on sustainable soil management and optimize available national resources





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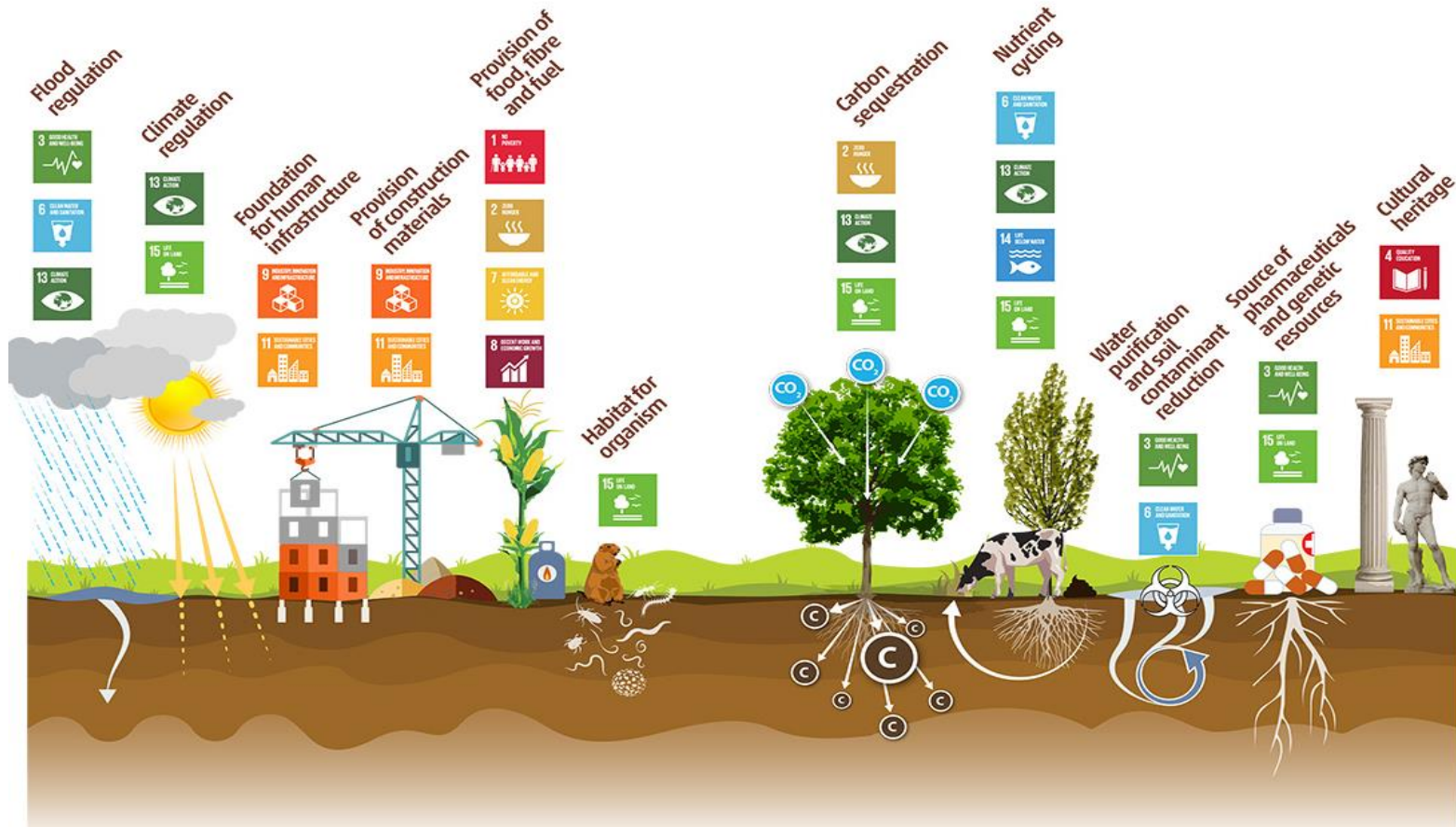
GLOBAL SOIL
PARTNERSHIP



The Global Soil Doctors Programme was developed as a response to the main global challenges

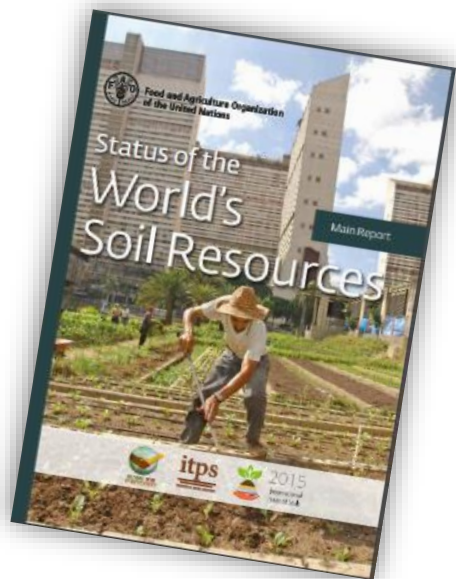


A healthy soil is capable of providing most terrestrial ecosystem services, therefore contributing to achieve the SDGs and human well-being

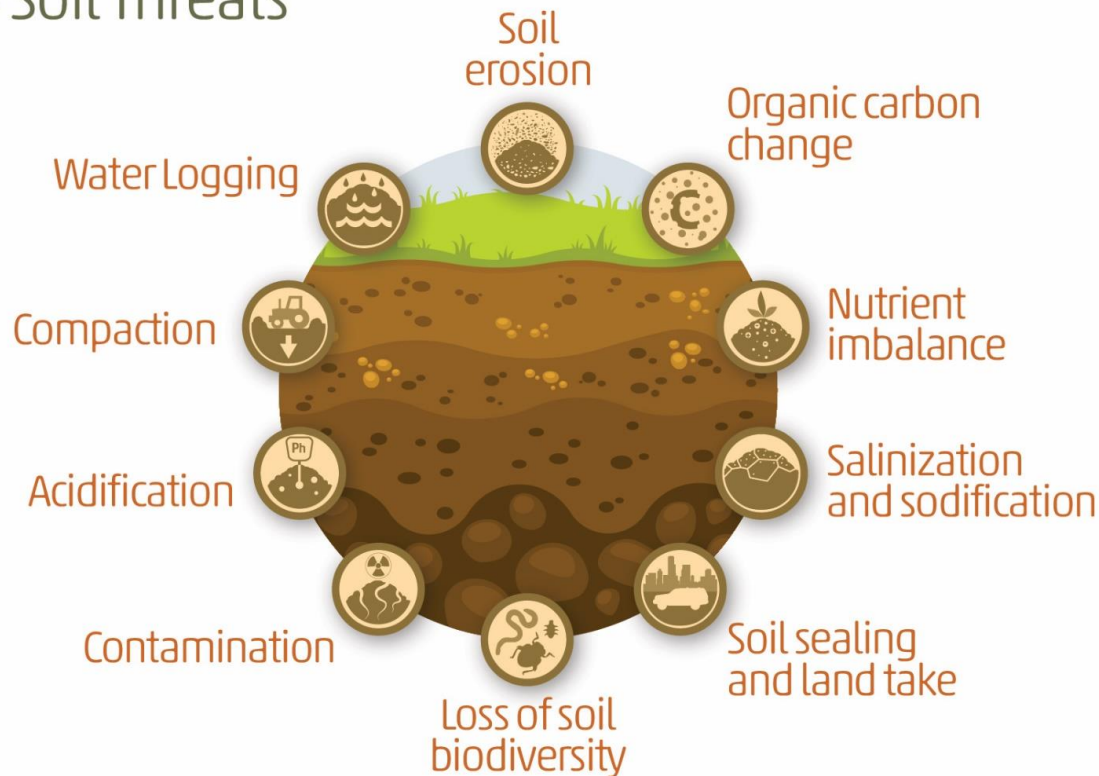




Yet the world's soils are at risk



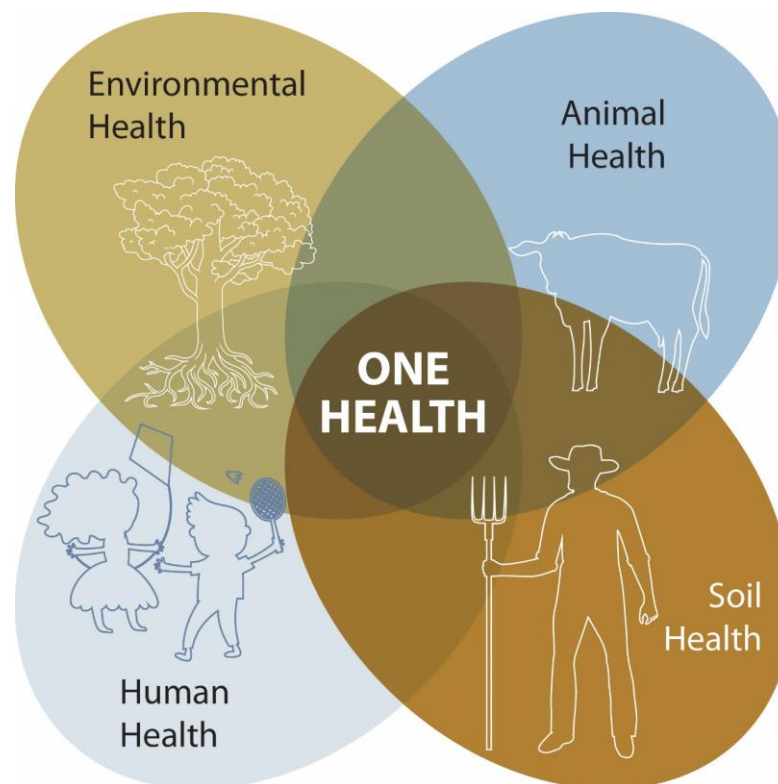
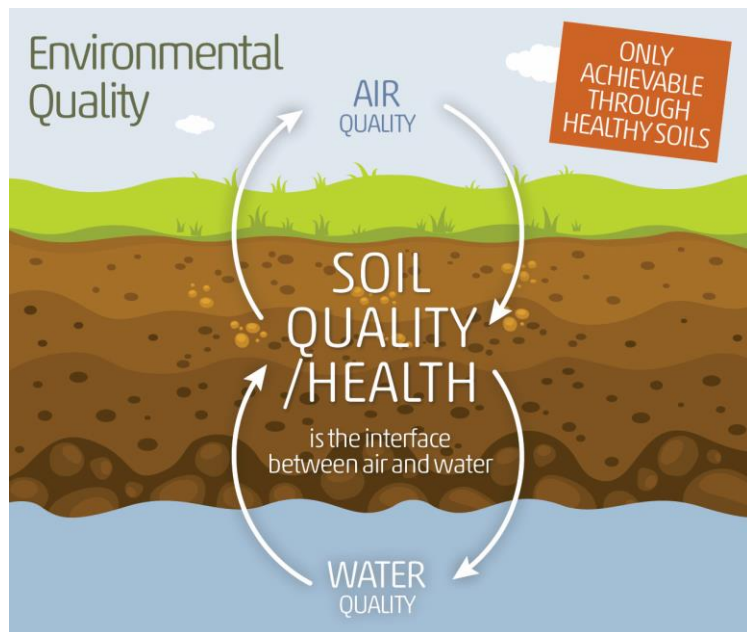
10 Soil Threats





Soils are a key resource

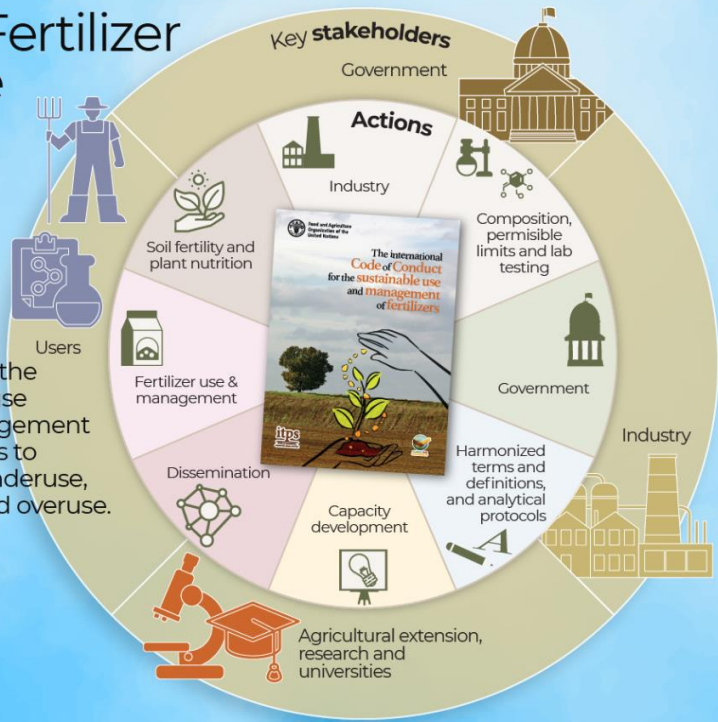
Farmers are the agents of change



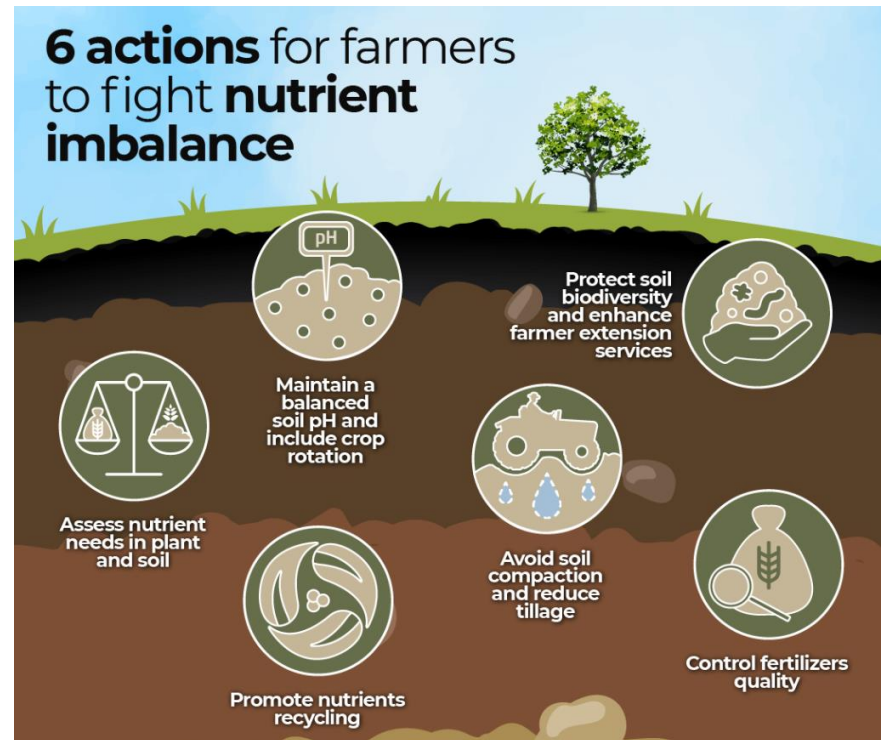


The Fertilizer Code

addresses the judicious use and management of fertilizers to prevent underuse, misuse and overuse.



6 actions for farmers to fight nutrient imbalance





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Polluted soils put our food chain and
the health of the planet at risk.



[Healthy soils: the foundation of healthy
food and a better environment](#)



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Fertilization should be combined with innovations such as biofertilization, nutrient recycling, biofortification and biostimulants.



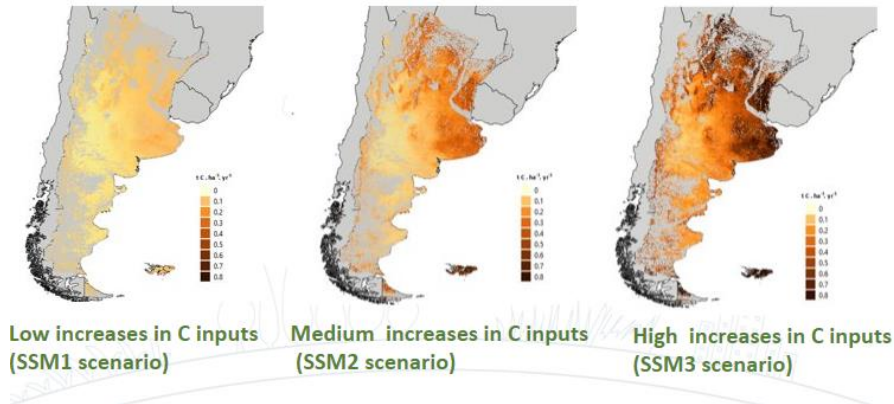
[Healthy soils: the foundation of healthy food and a better environment](#)



GLOBAL SOIL
PARTNERSHIP

Global Soil Organic Carbon Sequestration Potential Map

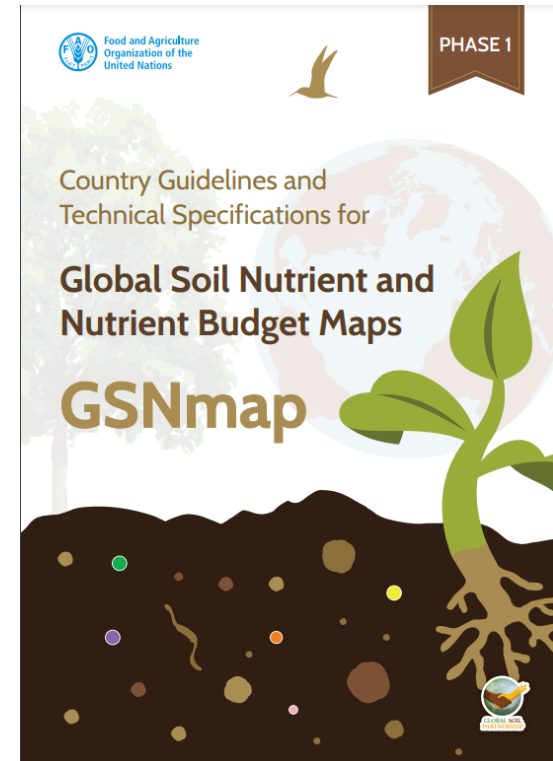
Projected Soil organic carbon annual increase for 2020-2040 after the adoption of sustainable soil management practices (SSM)



Capacity building: soil data and mapping

Technical support and capacity building for FAO SoilFER project (Guatemala, Honduras, Zambia)

- Infrared and gamma spectroscopy for soil property estimation
- Cosmic ray neutron sensor technology and satellite imagery for continuous soil moisture monitoring in representative agro-ecological zones
- Control of fertilizer quality






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English Español

Global Soil Partnership

- [Home](#)
- [Overview](#)
- [Partners](#)
- [Regional partnerships](#)
- [ITPS](#)
- [Technical networks](#)
- [Areas of work](#)
- [Soil Doctors Programme](#)**
- [Resources](#)



- About the Programme**
- How to get involved
- Educational material
- Implementation steps
- Implementation sites
- Publications and events

Welcome to the Global Soil Doctors Programme

A farmer-to-farmer training platform

The Global Soil Doctors Programme is a farmer-to-farmer training initiative that aims to build the capacity of farmers on sustainable soil management while supporting national governments and stakeholders in addressing the needs of their rural communities. This online platform provides support for farmers, policy makers, development planners, agricultural extension workers, NGOs, private sectors and any other practitioner/stakeholder interested in transmitting the importance of soil as a vital resource.

Check out [this poster](#) or read the [Terms of Reference](#) for more information about the implementation process. For any inquiries, please get in touch with soil-doctor@fao.org





How to get involved

How to get involved

Anyone can join the Global Soil Doctors Programme and contribute to the selection and training of Soil Doctors all over the world. Members of extension services, private sector, farmer associations, academia, soil science societies as well as independent actors, can be actively involved in the capacity building process. Moreover, the programme can benefit from the contribution of any actor who would like to share training materials, tutorials, local knowledge and field experiences through this website.



Promoter



Trainer



Soil Doctor



Farmer



Collaborator



Donor

Academia

Farmers

Government

Agro dealers

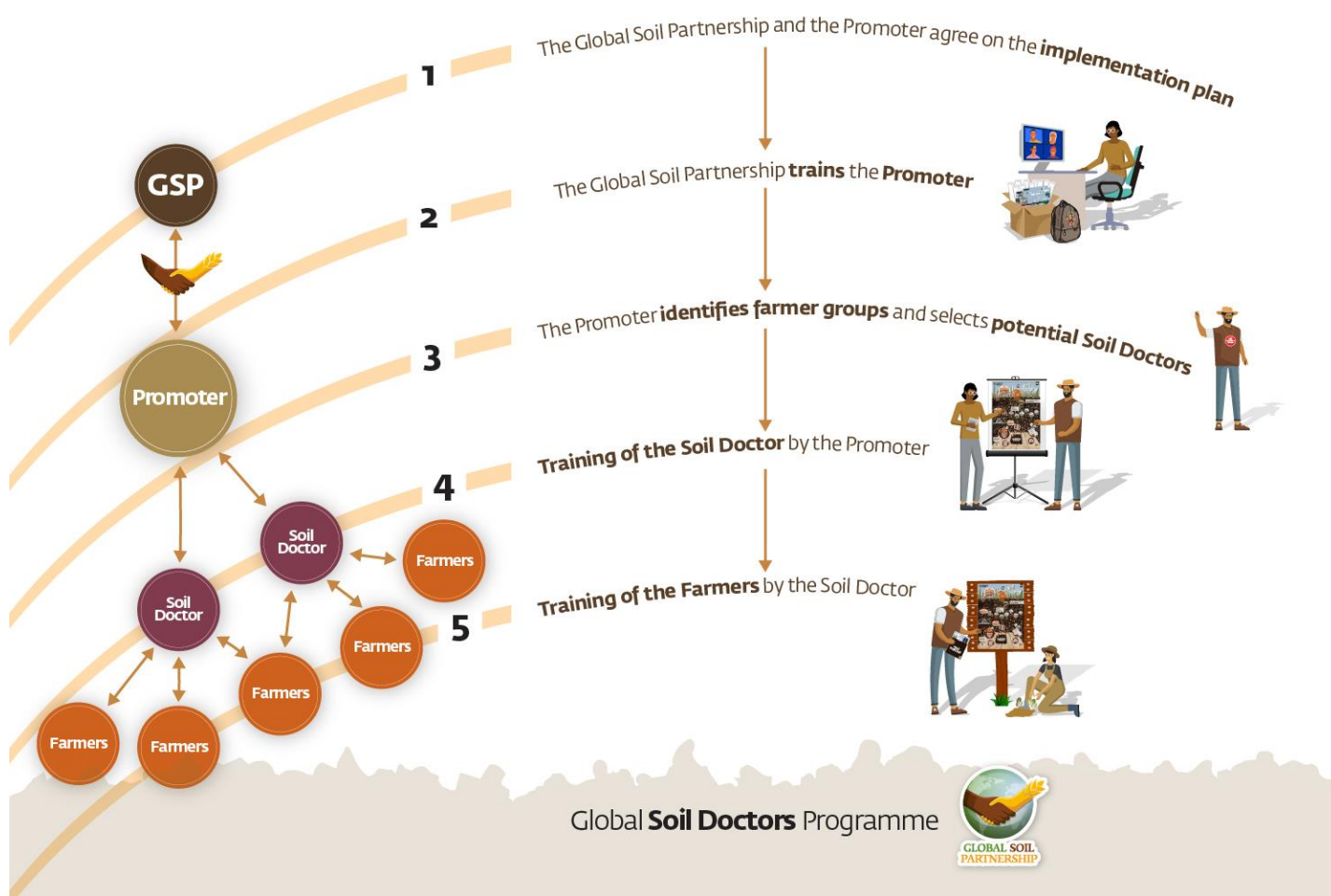




Actors



Roadmap

Roadmap





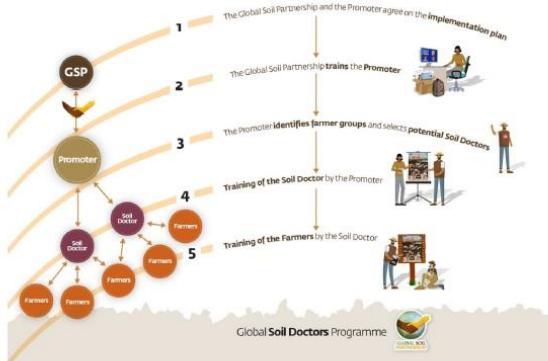
ToR and Registration

 Food and Agriculture Organization of the United Nations 

**GLOBAL SOIL DOCTORS PROGRAMME
PROMOTERS' TERMS OF REFERENCE (ToRs)**


The Global Soil Doctor Programme (GSDP) is a farmer-to-farmer training initiative that was developed by the Global Soil Partnership (GSP). The Programme aims to provide farmers with educational materials to learn about Sustainable Soil Management (SSM). The "champion" farmers – recognized as "Soil Doctors" – are selected to support and educate other farmers from their local community. This scheme creates a self-sufficient exchange process that promotes the practice of SSM.


The success of the Programme depends to a large extent on the existence of a promoter, a national institution or organization that facilitates the Programme and interacts with the GSP and all stakeholders. The promoter provides technical and financial support and ensures the sustainability of the Programme at the national or local level. The promoters are national figures from government agencies, extension services, academia, and non-governmental agencies (NGOs) that know and understand the local production and socio-economic conditions, challenges, and potential.



```


    graph TD
      GSP((GSP)) -- 1 --> Step1[The Global Soil Partnership and the Promoter agree on the Implementation plan]
      Step1 --> Step2[The Global Soil Partnership trains the Promoter]
      Step2 --> Step3[The Promoter identifies farmer groups and selects potential Soil Doctors]
      Step3 --> Step4[Training of the Soil Doctor by the Promoter]
      Step4 --> Step5[Training of the Farmers by the Soil Doctor]
      Step5 --> SD((Soil Doctor))
      SD --> F1((Farmer))
      SD --> F2((Farmer))
      SD --> F3((Farmer))
      SD --> F4((Farmer))
  
```

Global Soil Doctors Programme 



Promoters' registration form

The first step for the implementation of the Global Soil Doctors Programme (GSDP) at the local level is the identification of a potential Promoter. To determine your institution suitability in implementing the Global Soil Doctors programme, please read the terms of reference (included below). If you are interested in supporting the implementation of the programme in your country, please fill-in the present form. You will receive a CONFIRM of the registration by e-mail.

pioli.silvia84@gmail.com *Cambia account* 

*Campo obbligatorio

Email *

Il tuo indirizzo email _____

Name of the contact person

La tua risposta _____

Position of the contact person

La tua risposta _____

Country

Scegli _____

Municipality

La tua risposta _____

[Terms of reference](#)

[Registration link](#)



Posters' overview

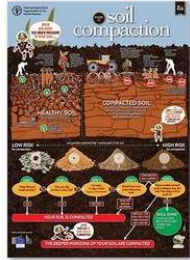
Posters



What is the Global Soil Doctors programme?



How to take a soil sample



What is soil compaction?



How to minimize soil erosion by wind?



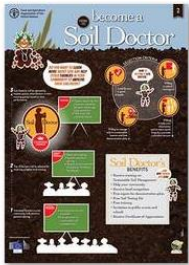
How to manage soil nutrients?



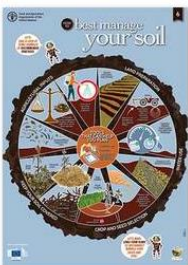
What are saline and sodic soils?



How to prevent soil pollution on agricultural fields?



How to become a Soil Doctor?



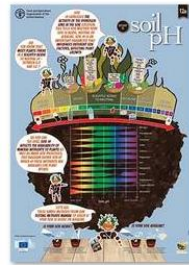
How to best manage your soil



How to prevent and remediate soil compaction?



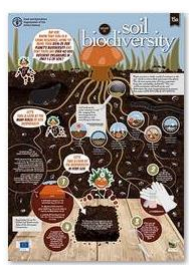
What is soil organic matter?



What is soil pH?



How to prevent soil salinization and sodification?



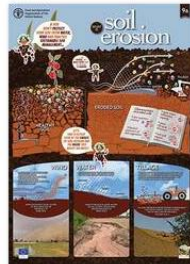
What is soil biodiversity?



Why are your crops not growing well?



What are the physical soil properties?



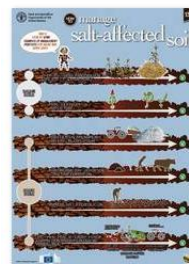
What is soil erosion?



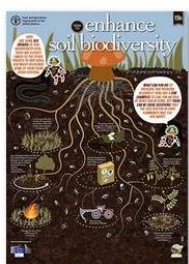
How to enhance soil organic matter content?



What is soil acidification?



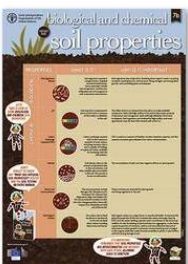
How to manage salt-affected soil?



How to enhance soil biodiversity?



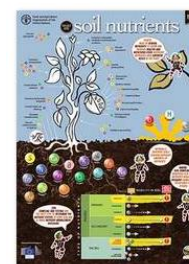
What is soil?



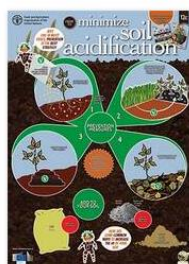
What are the biological and chemical soil properties?



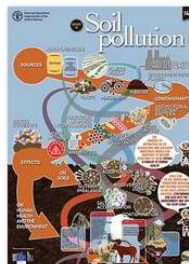
How to minimize soil erosion by water?



What are soil nutrients?



How to minimize soil acidification?



What is soil pollution?

Posters translations



What is soil?

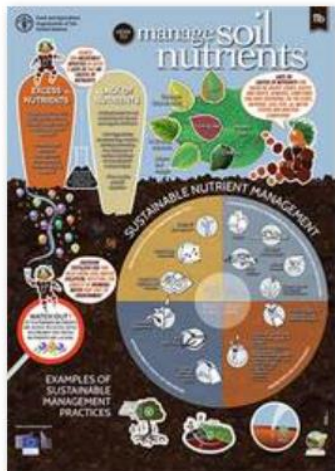
Soils are complex mixtures of minerals, water, air, organic matter, and countless organisms that together support life on Earth.

Download PDF: [High res](#)

Official languages: [French](#) | [Spanish](#) | [Chinese](#) | [Russian](#) | [Arabic](#)

Other languages

[Chichewa](#); [Chewa](#); [Nyanja](#) - [High res](#) | [Kazakh](#) - [High res](#) | [Tumbuka](#) - [High res](#) (soon available)



How to manage soil nutrients?

This poster explains how to manage soil nutrients.

Download PDF: [High res](#)

Official languages: [French](#) | [Spanish](#) | [Chinese](#) | [Russian](#) | [Arabic](#)

Other languages

[Chichewa](#); [Chewa](#); [Nyanja](#) - [High res](#) (soon available) | [Tumbuka](#) - [High res](#)

Soil educational kits











Soil Kit - Standard version <u>(qualitative assessment)</u>	
Type	Feature
Physical properties	Texture
	Organic matter*
	Soil structure
	Aggregate stability
Chemical properties	Soil pH
	Carbonates
Biological properties	Litter decomposition
	Invertebrates
	Roots status*

*the assessment of this parameter does not need any specific tool, just a visual evaluation

Soil educational kits



Field exercises

Physical soil properties – Exercise P04	
SOIL AGGREGATE STABILITY: SLAKE TEST ¹	
RELEVANCE	Soil stability is a key property that is related to soil chemical, physical and biological dynamics. The slake test is a simple method to evaluate soil structure in the field. It is based on the observation that clumps of soils with poor structure fall apart when placed into water. If soil structure is stable, water can move into the soil pores and displace the air without causing the aggregate to break. It is advisable to compare different soils for a more reliable evaluation.
MATERIALS*	 Wire Mesh  Trowel  Beaker  Stopwatch <i>*Water is needed</i>
PROCEDURE	1) Place the wired mesh into the beaker filled with water  © Patis
	2) Collect a clump of soil with the trowel  © Patis
	3) Place the soil aggregate sample onto the mesh so that the whole sample is submerged  © Patis
	4) Use the stopwatch to time how quickly the sample breaks down  © Patis

Front

ADVANTAGES OF THE METHOD	Soils with different texture and/or different management can be compared. Quick to estimate.	
LIMITATIONS OF THE METHOD	For a more accurate assessment, soil should be air dried before the test	
QUESTIONS TO BE ADDRESSED	How long does it take for your soil to fall apart in the water? After 5 minutes, what percent of the soil clod remains? Did you compare different soil types? What conclusion can you draw? What can be the cause of faster dissolution?	
EVALUATION EXAMPLES		
POOR	MODERATE	GOOD
The clump of soil disintegrate and fall apart in less than 1 minute.	The clump of soil disintegrate and fall apart in 1-5 minutes / a small portion of the clump remains intact	The clump of soil disintegrate and fall apart in >5 minutes / a large portion of the clump remains intact
¹ sources: https://www.nrcs.usda.gov/wps/PA_NRCSSConsumption/download?cid=nrcseprd1762487&ext=pdf https://quiviracoalition.org/product/soil-health-workbook/		

Back

Evaluation of soil conditions and recommendations



INTERPRETATION	
PHYSICAL SOIL PROPERTIES	The physical condition of a soil determines its holding capacity, ease of root penetration, air circulation, water storage capacity, drainage and nutrient retention, among other factors. In case of physical constraint, we must look for sustainable management practices for the mitigation or prevention of possible problems, e.g., compaction
CHEMICAL SOIL PROPERTIES	The chemical condition of a soil regulates the availability of plant nutrients, plant growth and resistance to parasites, as well as soil biological activity. In case of chemical constraint, attention should be paid to soil use and management through amendments or organic matter management to improve the desired soil properties.
BIOLOGICAL SOIL PROPERTIES	The biological condition of a soil determines the rate of organic matter decomposition and nutrient release. Moreover, earthworms and other arthropods improve soil porosity, structure, stability and drainage. If our soil shows biological limitations, we should focus on possible toxic effects which limit the efficiency of soil management for agricultural production.
GENERAL EVALUATION	
The evaluations of soil condition after each exercise may be combined to assess the general soil physical, chemical and biological properties. If you have scored poor or moderate soil properties, please refer to the following table to get to know which are the best practices to halt soil degradation and promote sustainable soil management. If you are not currently facing any issues related to soil health, you may be interested in a general overview of sustainable soil management practices to prevent the loss of soil functions in the future (e.g., poster n. 6).	

Front

RECOMMENDED MANAGEMENT PRACTICES			
<i>For more details on how to improve soil properties, refer to posters' numbers given in the table</i>			
	Improve physical properties	Improve chemical properties	Improve biological properties
Avoid heavy machinery when not necessary (to avoid compaction)			P6
Reduce tillage	P6; P9b		
Optimize irrigation (water quality and water use efficiency)	P6; P10b		
Choose crop rotation	P6; P10b; P9c	P6; P10b	
Choose mixed cropping (possibly with legumes)	P6; P10b; P9c	P6; P10b	
Use mulch, crop residue or cover crops	P6; P10b; P9b; P9c	P6; P10b	
Avoid overgrazing (rotate the grazing area or reduce the number of animals per unit area)	P10b	P10b	P10b
Prefer organic fertilizers	P10b	P10b	
Make a sustainable use and management of plant nutrients (right time, source, place and rate)	P6; P10b	P6; P10b	




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Modules



Topic	Specific soil topic (e.g general soil properties, nutrients, salinity)
Posters	4 posters to be chosen among those available
Field exercises	3- 4 field exercises related to the topic including physical, chemical, biological observations
Evaluation	Final evaluation of soil condition and recommendations

Example: Module 1

Topic	Soil 4 Nutrition
Objective	Emphasize the role of soil nutrients and soil structural components for agricultural production, food security and nutrition. Identify the best soil conditions that optimize plant nutrients uptake
Posters	<p>What is soil?, How to enhance soil organic matter? What is soil pH?, How to manage soil nutrients?</p> 
Field exercises	<p>Qualitative assessment of soil physical, chemical and biological properties.</p> 
Evaluation	<p>Final evaluation of soil condition and recommendations on SSM practices</p> 

Visual identity



Communication and visibility



- New website

Global Soil Doctors Programme

Welcome to the Global Soil Doctors Programme

A farmer-to-farmer training platform

This webpage is designed as a **source of soil information and knowledge on the different components and aspects of the Global Soil Doctors Programme - a farmer-to-farmer training platform**, and the **importance of soil as a vital resource** for farmers, policy makers, development planners, agricultural extension workers, NGOs, private sectors and any other practitioners/interested stakeholder.

Collaborators Implementation sites Registered promoters

Communication and visibility



About the Programme

How to get involved

Educational material

Implementation steps

Implementation sites

Africa

Asia

Europe

Latin America and the Caribbean

Near East and North Africa

North America

Pacific

Publications and events

AFRICA



This section provides information about the Soil Doctors Programme implementation in the African region.

LIST OF COUNTRIES

Benin, Botswana, **Burkina Faso**, Cameroon, Chad, Cape Verde, Central African Republic, Djibouti, DR Congo, Equatorial Guinea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Madagascar, **Malawi**, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, South Africa, Tanzania, Togo, Uganda, Zambia.

MALAWI

BURKINA FASO

BURKINA FASO



Communication and visibility



- Highlights published regularly

Positioning the Soil Doctors Programme as a mechanism that matters

As the Soil Doctors Programme enters its second year, it has successfully scaled-up farmer-to-farmer training initiatives in Bangladesh, Malawi and Mexico. The Programme will continue to strike up robust partnerships for the benefit of smallholders, empowering them to scale-up cost-effective, sustainable soil management (SSM) practices.



27/01/2022 Empowering farmers to safeguard sustainable soils

The Global Soil Doctor Programme is a farmer-to-farmer training initiative that was launched in 2020 under the framework of FAO's Global Soil Partnership (GSP). The overall objective of the Programme is to strengthen the capacity of farmers on SSM principles by providing them with targeted training on how to preserve and restore good soil conditions and functions. It also contributes to raising awareness of soils globally.

These pilot schemes have illustrated the importance of establishing a strong working relationship between the GSP

the national promoters to reach other farmers in the

Promoters are an essential resource in a country so that the resources to extend to other agencies, national organizations (NGOs)

Thailand's testing kits empower farmers to monitor the state of their soils

Getting the balance right: regulating soil pH values to improve agricultural production



23/02/2022 The Global Soil Partnership's (GSP) Soil Doctors Programme is upgrading the soil testing kits that are part of the Programme's educational materials thanks to a donation from the government of Thailand.

Earlier this month, Thailand donated 1,000 soil pH testing kits to the GSP to be distributed to farmers who are participating in the Programme, which currently spans Bangladesh, Bolivia, Burkina

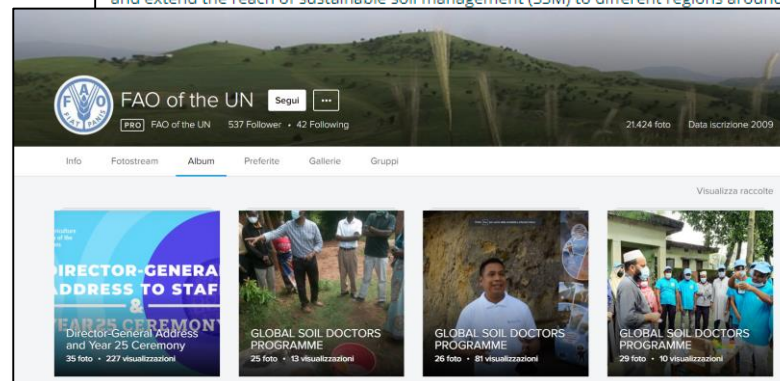
Faso, Colombia, the Gambia, and Mexico.

Other countries will be selected to engage over the course of 2022 so that the Programme can enhance its' capacities and extend the reach of sustainable soil management (SSM) to different regions around the world.

ly through the GSP. The Thai is committed to soil health

gnised soil scientist, and the

- Media gallery updated regularly





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Thank you !

Malawi



Mexico



Bangladesh



Kazakhstan



Bolivia



Contacts → soil-doctor@fao.org