



Food and Agriculture
Organization of the
United Nations

INSOP Food Quality working group meeting

Farmers training and soil pollution indicators in the One Health approach

14 December 2023



Global **Soil Doctors**
Programme



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



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Soils and SDGs

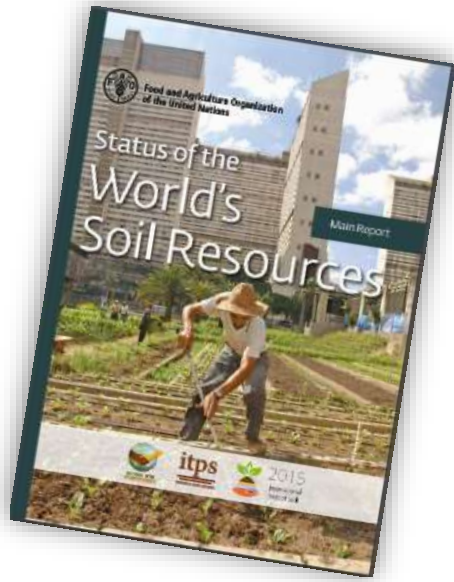
Healthy soils
perform/provide
key functions
and ecosystem services



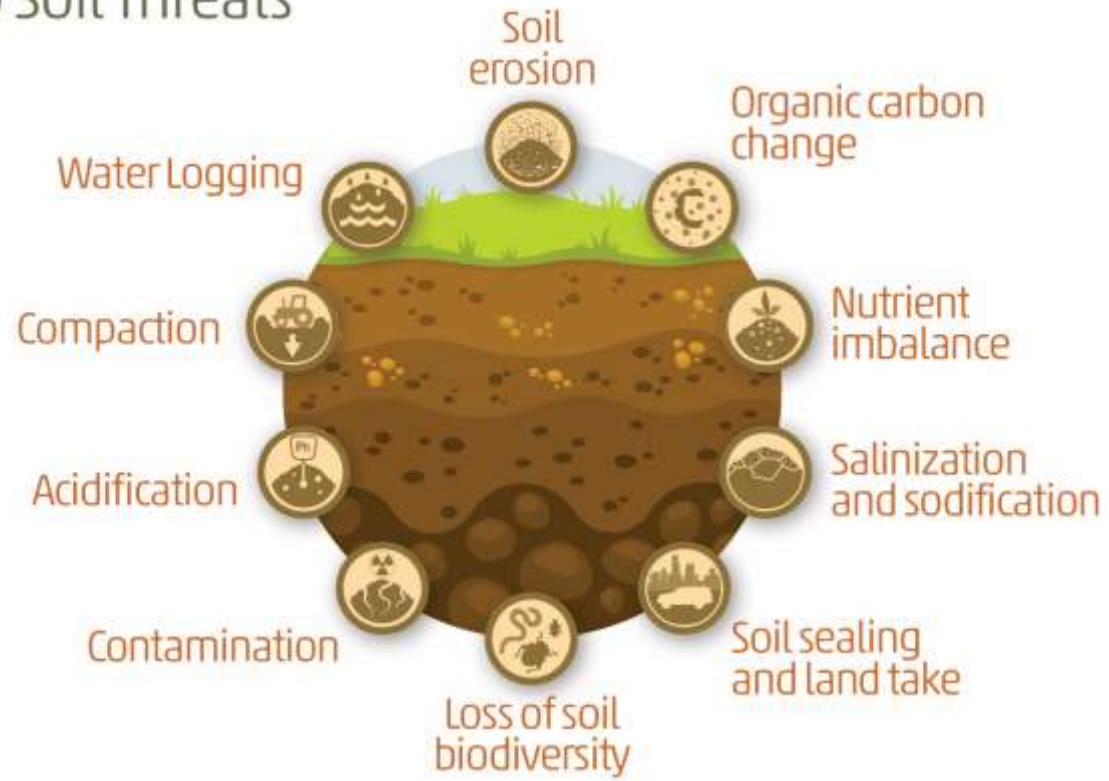
© FAO 2022
GEM/2021/01



Yet the world's soils are at risk



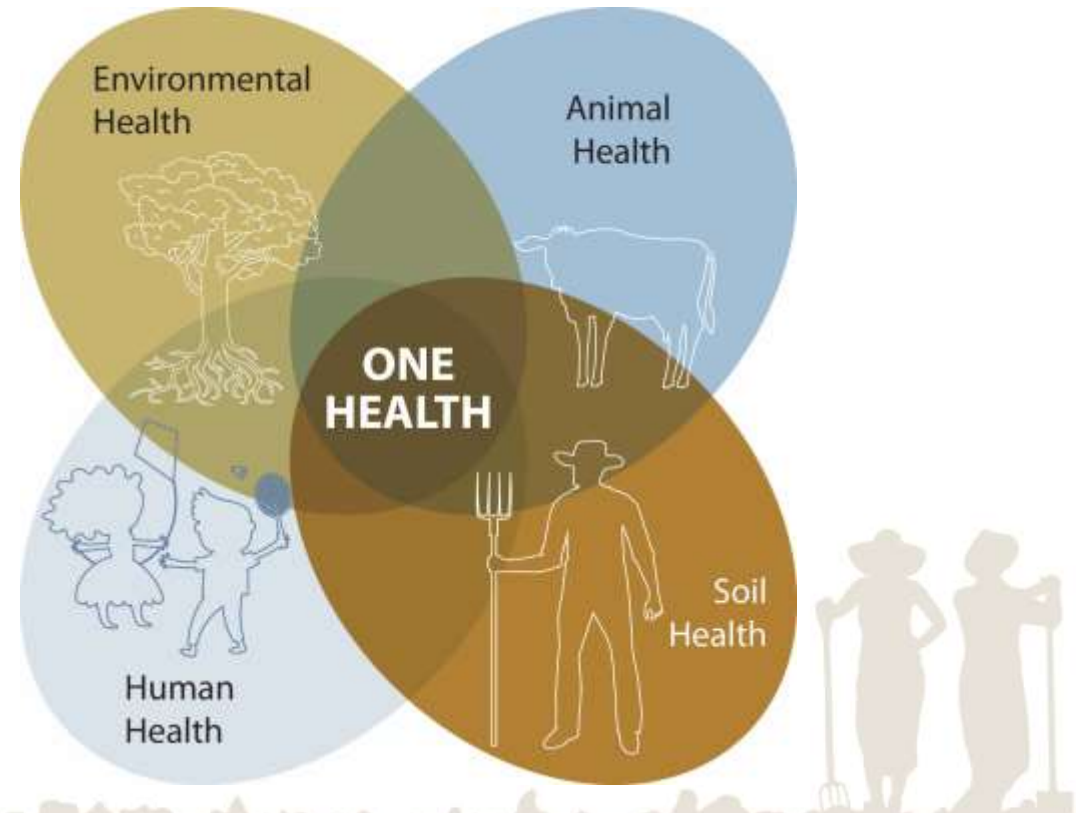
10 Soil Threats



Soils are a key resource



Farmers are the agents of change



Scientific inputs and feedback





Global Soil Partnership

	Overview	Partners	Regional partnerships	ITPS	Technical networks	Areas of work	Soil Doctors Programme	Resources
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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

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.














Educational material



Training modules

Example: Module 1 Soils for nutrition

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> <div style="display: flex; justify-content: space-around; align-items: center;">  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">What is soil?</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">How to enhance soil organic matter content?</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">What is soil pH?</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">How to manage soil nutrients?</p> </div>
Field exercises	<p>Qualitative assessment of soil physical, chemical and biological properties.</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Texture</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Observation of soil structure</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Soil pH</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Organic matter: Colour observation</p>  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Roots</p> </div>
Evaluation	<p>Final evaluation of soil condition and recommendations on SSM practices</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>



Posters' overview: 27 posters available



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?



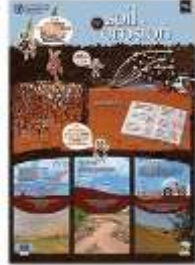
What is soil biodiversity?



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?



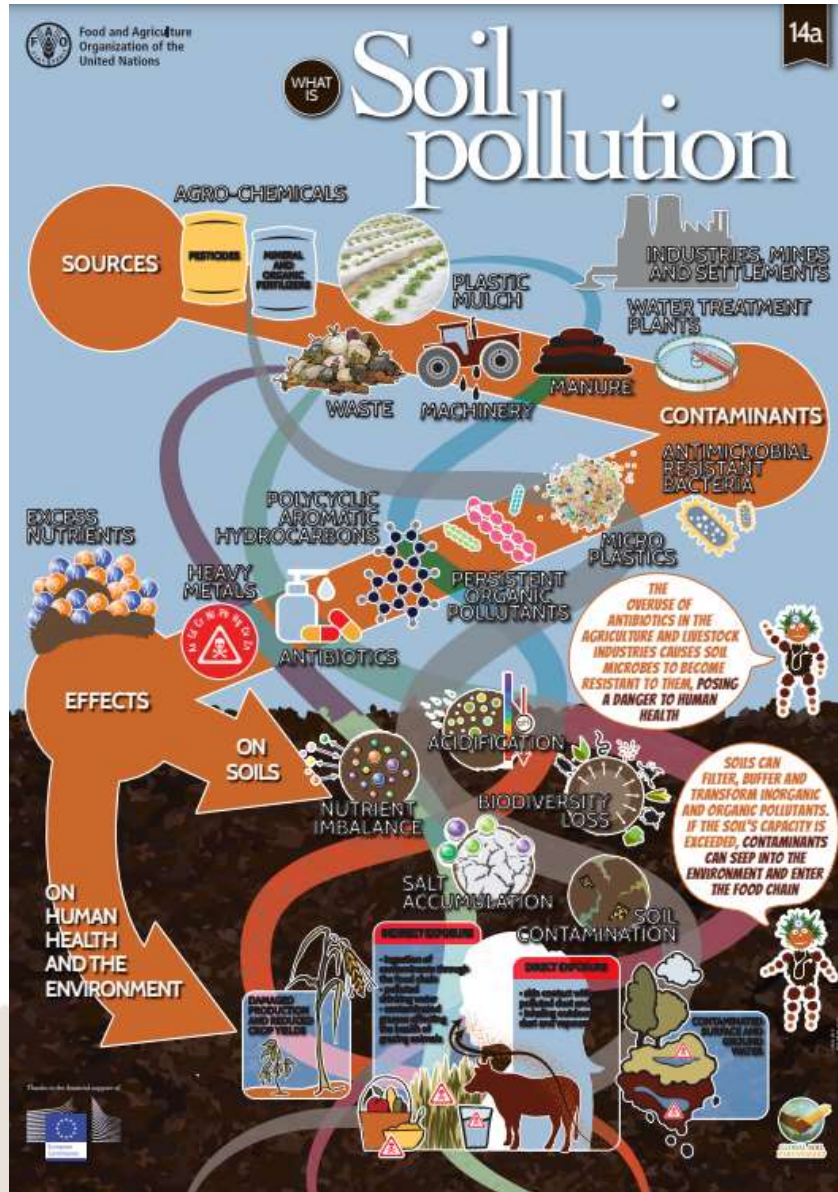
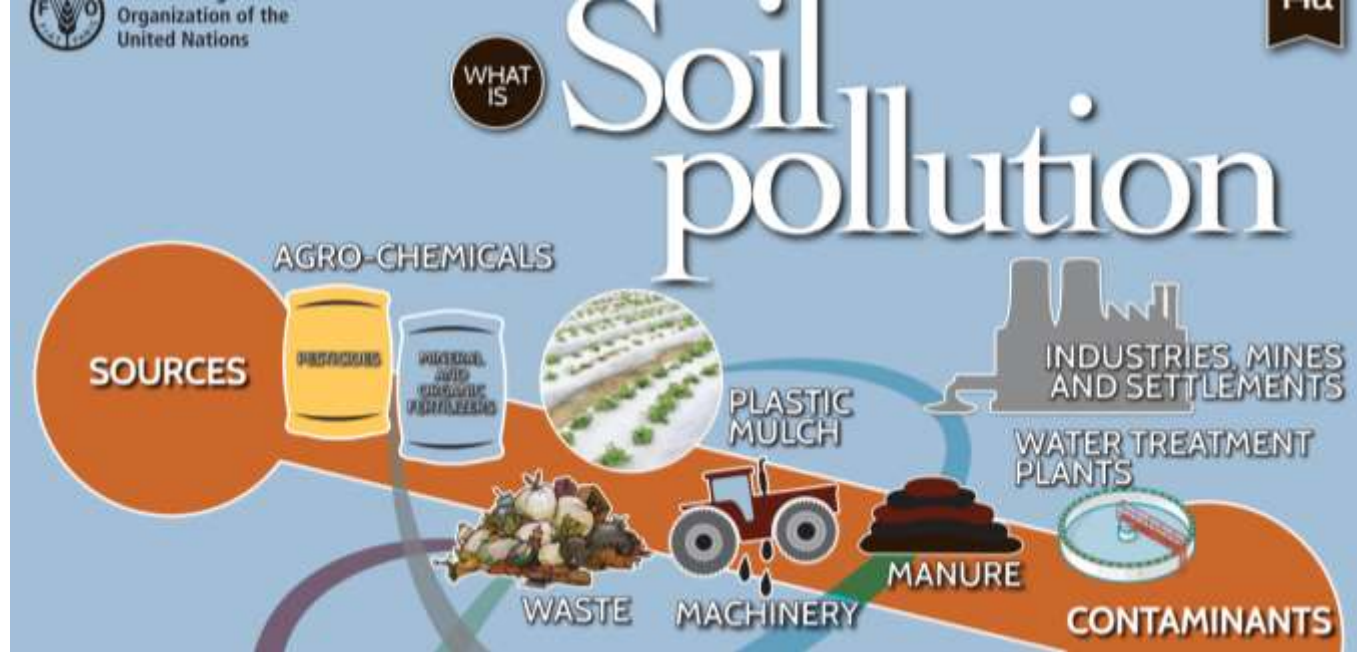
How to minimize soil acidification?



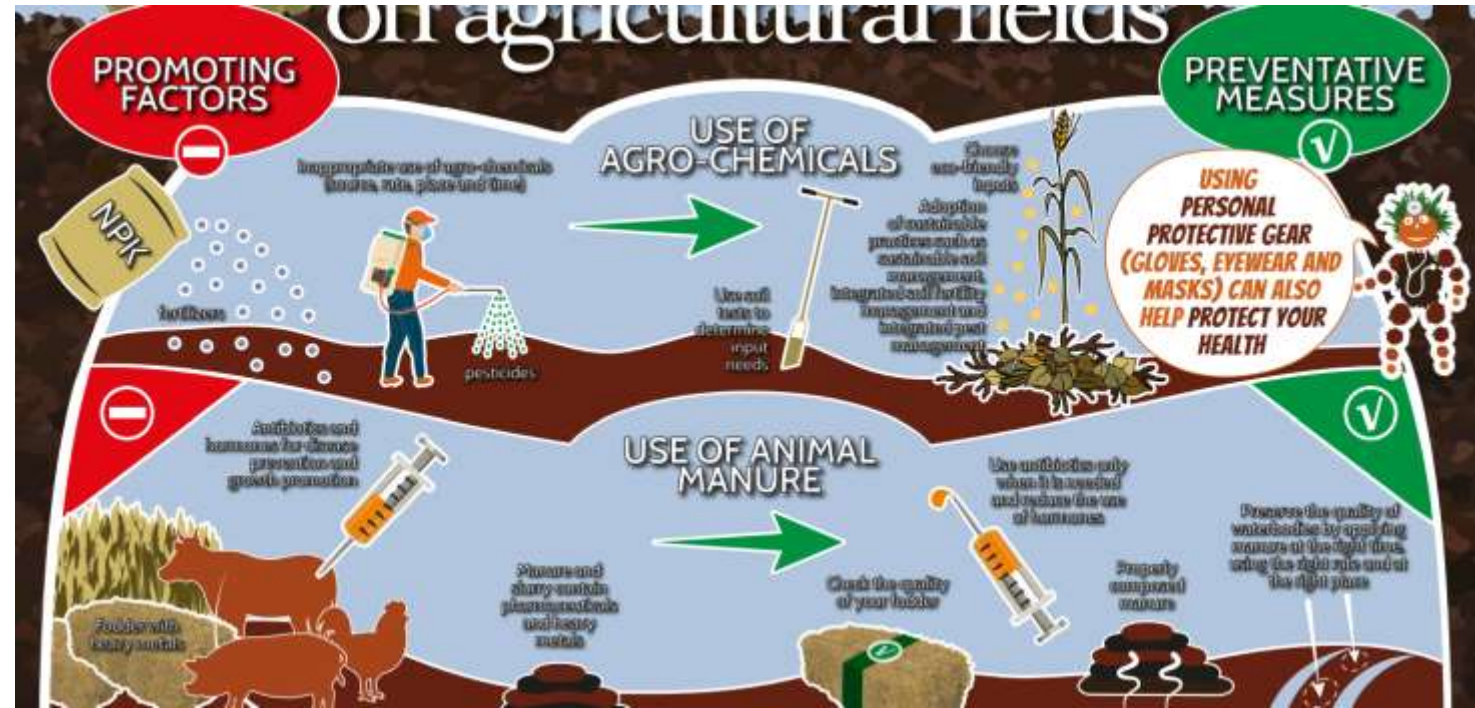
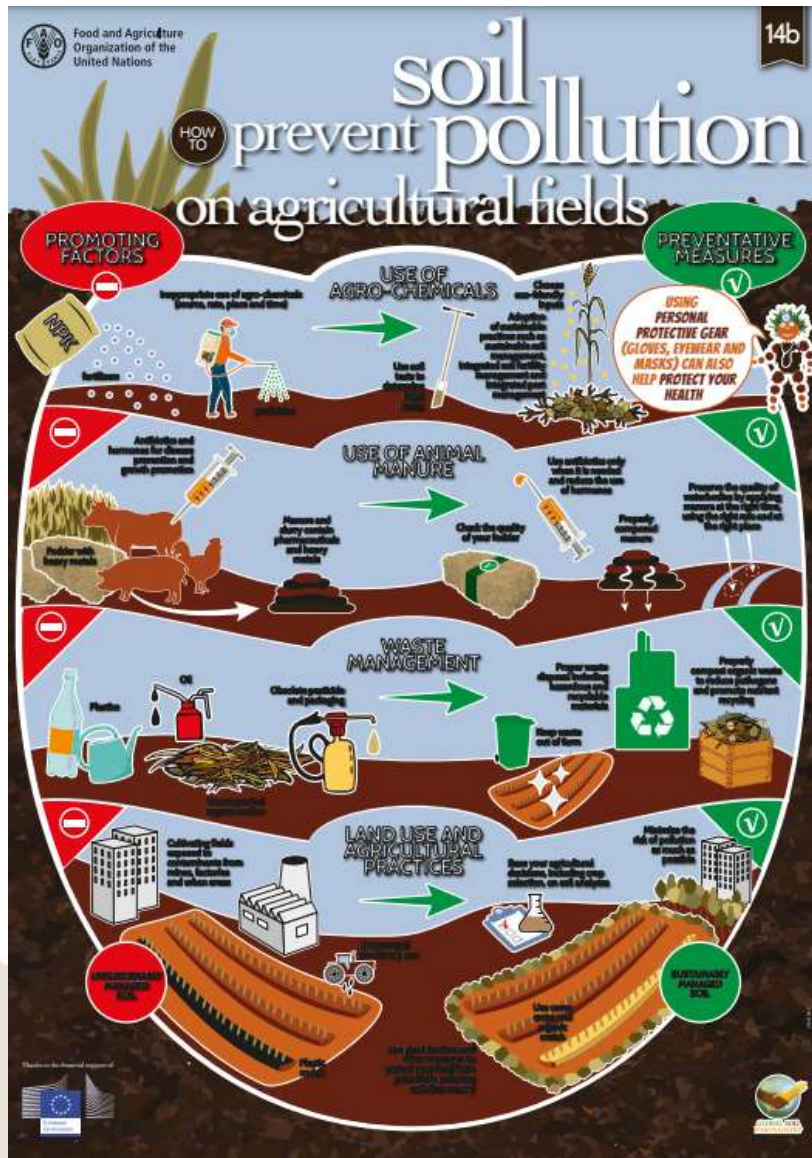
What is soil pollution?



What is soil pollution?



How to prevent soil pollution on agricultural fields?











Soil educational kits

Soil Kit - Standard version


Type	Feature
Physical properties	Texture
	Organic matter
	Soil structure
	Aggregate stability
Chemical properties	Soil pH
	Carbonates
Biological properties	Litter decomposition
	Invertebrates
	Roots status



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_NRCSCONSUMPTION/download?cid=nrcseprd1762487&ext=pdf https://quiviracoalition.org/product/soil-health-workbook/		

Back

Evaluation card and recommended practices



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Date: _____
Place: _____

SOIL EVALUATION

It is recommended that at least one physical property, one chemical property, and one biological property are evaluated. At the end of the evaluation, mark the property that needs to be improved as a priority.

Property		Tests <i>Mark the applied test(s)</i>	POOR	MODERATE	GOOD
PHYSICAL PROPERTIES	Texture <input type="checkbox"/> Coarse <input type="checkbox"/> Medium <input type="checkbox"/> Fine	Texture/ring method – Texture/ribbon method			
	Structure	Structure/observation – Structure – slake test			
	Compaction, drainage	Compaction/Mottles – Penetration resistance – Infiltration test			
	Soil moisture*				
CHEMICAL PROPERTIES	Soil pH	LDD-kit – pH strips – Red cabbage extract – Vinegar/Baking soda			
	Organic matter	OM/Colour – OM/peroxyde			
	Nutrient availability*	Nutrient availability			
	Salinity*	Electrical conductivity/			
	Presence of allophanes (Al)*	Volcanic ashes			
	Presence of carbonates *	Carbonates			
BIOLOGICAL PROPERTIES	Roots observation	Roots observation			
	Earthworms, meso and macrofauna*	Earthworms counts			
	Decomposition of the organic matter*	OM decomposition			

* optional Global Soil Doctors Programme | fieldversion

Way forward

- Adjust the pollution posters
- Develop field exercises on soil pollution
- Develop Module 1 and Module 2 guidelines on soil pollution
- Compile case studies on soil pollution prevention and remediation





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Thank you
Soil-doctor@fao.org



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