



Food and Agriculture  
Organization of the  
United Nations

# 9<sup>th</sup> Asian Soil Partnership MEETING

23 - 24 April 2024

Asian watch on the impacts of  
sustainable soil management  
- Concept presentation -

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## Objective

To assist decision-making processes.

Specifically, the platform aims to address the question:

**"Which sustainable soil management practices are most suitable for specific locations, considering their potential impacts?"**

The platform helps identifying the most cost-effective and impactful sustainable soil management practices, taking into account the specific characteristics of different agroecological zones (GAEZ v4). However, its purpose extends to guiding investments, informing project formulation decisions, and guiding research efforts on the topic as the platform helps identifying eventual knowledge gaps.

**Beneficiaries:** government officials, policy makers, farmers, pastoralists, forest and land managers, extension services and agricultural advisors, development partners, researchers, private sector and, academia, etc.

The platform will be integrated into FAO's existing regional information systems to avoid the generation of multiple platforms.



## 1 - Land and Water Resources

## 2 - Agro-climatic Resources

## 3 - Agro-climatic Potential Yield

## 4 - Suitability and Attainable Yield

## 5 - Actual Yields & Production

## 6 - Yield and Production Gaps

Filter Rasters

### Land and Water Resources

Sub-Theme Name is

Agro-ecological Zones

Variable Name is

Dominant AEZ class (33 classes) at 5 arc-minutes

Time Period is

- empty -

Climate Data Source is

- empty -

RCP is

Choose Renderer or Palette

Current Theme: Land and Water Resources

AEZ Classification (33 Classes)

Apply

About this Data

[Land and Water Resources theme](#)





## What is it?

A platform that helps assessing the short- (1-2 years), medium- (3-5 years) and long-term (5+ years) impacts of various SSM practices on:

- Crop yield (quantity of);
- Crop yield (nutrient content of leaves, grains, and fruits);
- Soil health in terms of:
  - Soil fertility;
  - Climate change mitigation potential;
  - Soil compaction;
  - Soil biodiversity;
  - Soil pollution; and
  - Soil erosion.

Where possible, it also provides information on the economics of each practice and their impacts on water resources. Impacts are derived from available soil, plant and water data and reported by agroecological zone.

## Selected parameters : SOIL

Soil chemical parameters	Soil physical parameters	Soil biological parameters
Soil pH; Electrical conductivity; Soil organic carbon (*); Organic matter; Available phosphorus; Available potassium; Total nitrogen; Extractable calcium; Extractable magnesium; Extractable sulphur; and Cation exchange capacity  For soil pollution: -Heavy metals; and -Hydrocarbons.	Soil texture; Soil structure; Bulk density (*); Soil moisture; and Soil temperature.	Soil respiration rate (*); Microbial biomass Enzyme activity; Soil mesofauna; and Nematodes

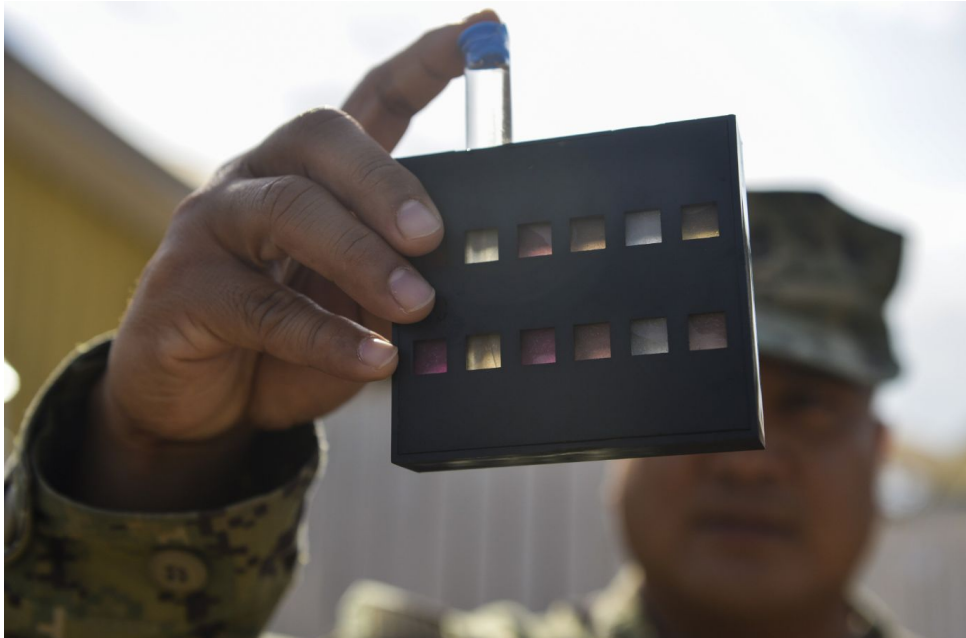
\*They align to the parameters considered in the protocol for the assessment of sustainable soil management released by FAO-ITPS in 2020, and anticipate the data needed to assess soil health in the index and indicators under development by the Global Soil Partnership, FAO. Still, they consider the guidelines for National Greenhouse Gas Inventories by the Intergovernmental Panel on Climate Change (IPCC) and take into account parameters that are pertinent to international funds, including those associated with the Global Environment Facility (GEF) and the Green Climate Fund (GCF).

## Selected parameters : PLANT

Quantity of the yield (t ha<sup>-1</sup> year<sup>-1</sup>)

Nutrient content of the plant's leaves, grains, and fruits:

- Total nitrogen (N);
- Total phosphorus (P);
- Total potassium (K);
- Total calcium (Ca);
- Total magnesium (Mg).



## Selected parameters : WATER

For determining the impacts of different SSM practices on surface water and groundwater:

- Water pH;
- Electrical conductivity;
- Dissolved oxygen;
- Ammonium;
- Chlorophyll concentrations;
- Turbidity;
- Sediments;
- Nitrate;
- Heavy metals;
- Pesticides; and
- Organic pollutants.

Collaborations with platforms like WAPOR and Aquacrop can be explored!

Notes: It might be difficult to collect soil-water quality related data. There are few studies associated soil health to crop yields and nutrient contents.

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## Data collection

- The platform operates with existing data (obtained from the literature or through spontaneous contributions as **data holders are encouraged to actively contribute to the platform development**) as well as data generated by ad-hoc projects
- online data entry system that enquires on e.g. agroecological zone type, SSM practice applied, cost of the practice, status of soil (soil parameters), crop yield (quantity), crop yield (nutrient content), water quality; and water quantity. Data refer to two time periods:
  - Time 0: before the SSM practice is implemented; and
  - Time X: after the SSM practice is implemented. These data are time specific as they serve to assess short-, medium- and long-term impacts.
- Each data entry is associated with the method of analysis and unit of measure to aid interpretation and comparative study.
- Data are verified before being added to the platform.
- Under the umbrella of the Food and Agriculture Organization of the United Nations (FAO) and the Center of Excellence on Soil Research in Asia (CESRA), this approach to data collection and analysis is expected to promote intra- and interregional collaboration on research.

To facilitate **data interpretation**, the platform provides information in both quantitative and qualitative forms:

- Quantitative data interpretation: relies on the use of numerical data to identify trends and relationships within the dataset. Quantitative data are available for soil, plant or water parameters;

- Qualitative data interpretation: relies on the use of colors for identifying trends at the scope of easing the understanding of quantitative data. In the platform, the following colors are employed:

- Color **green**: it is used to indicate positive trends in the value of a certain parameter, the status of the soil, or the crop yield.
- Color **yellow**: it indicates stable or insignificant changes.
- Color **red**: it is used to indicate negative trends in the value of a certain parameter, the status of the soil, or the crop yield.

Qualitative data are available for soil, plant and water related parameters as well as for impacts.





# Assessment of impacts

	Visual assessment	Soil analysis			Plant analysis		Notes on further assessment
		Chemical parameters	Physical parameters	Biological parameters	Yield	Leaves, grains, fruits	
<b>Soil erosion control</b>	Exposed roots Gullies Loss of topsoil Presence of wind-transported sediments on vegetation or structures		Aggregate stability Bulk density Water retention Hydraulic conductivity				Rainfall simulation on a small plot Sediment traps (sediment analysis can also help determining the amount of nutrients lost by erosion) GIS mapping Soil erosion models
<b>Soil compaction reduction</b>	Reduced root growth Poor water infiltration		Soil moisture content Soil texture Soil structure Bulk density Infiltration rate test Water retention	Microbial biomass Mesofauna and nematodes Basal soil respiration			Penetrometer test

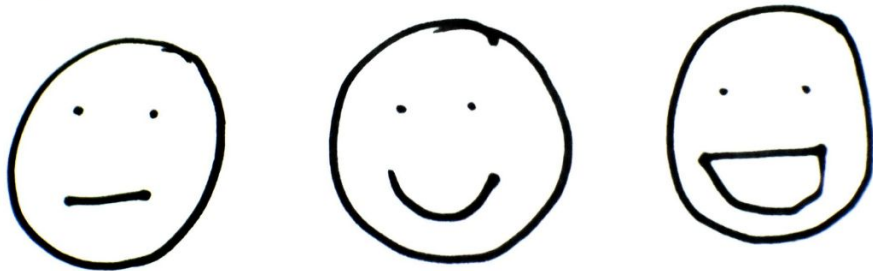
# Classification of impacts



	Impacts of the practice			Notes
	Low	Medium	High	
Soil erosion control				
Soil compaction reduction				
Soil biodiversity preservation				
Climate change mitigation				
Soil fertility				
Yield (quantity increase)				
Yield (quality – nutrient content)				
Plant health (water use efficiency)				
Groundwater recharge				



# Feedback



*•How do you like the idea? Would you find it useful to have such platform in place?*

*•Would you/your country/office be willing to contribute to the platform development (also in terms of data entry)?*

Coming next:

- Establishment of a technical working group to progress on the CN and platform development
- FAORAP to recruit an expert to support (links with RAP's work on climate change)





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# Thank you

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