



Food and Agriculture  
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# Miriam Ostinelli Global Soil Laboratory Network (GLOSOLAN) and its initiative on soil spectroscopy (GLOSOLAN-Spec)

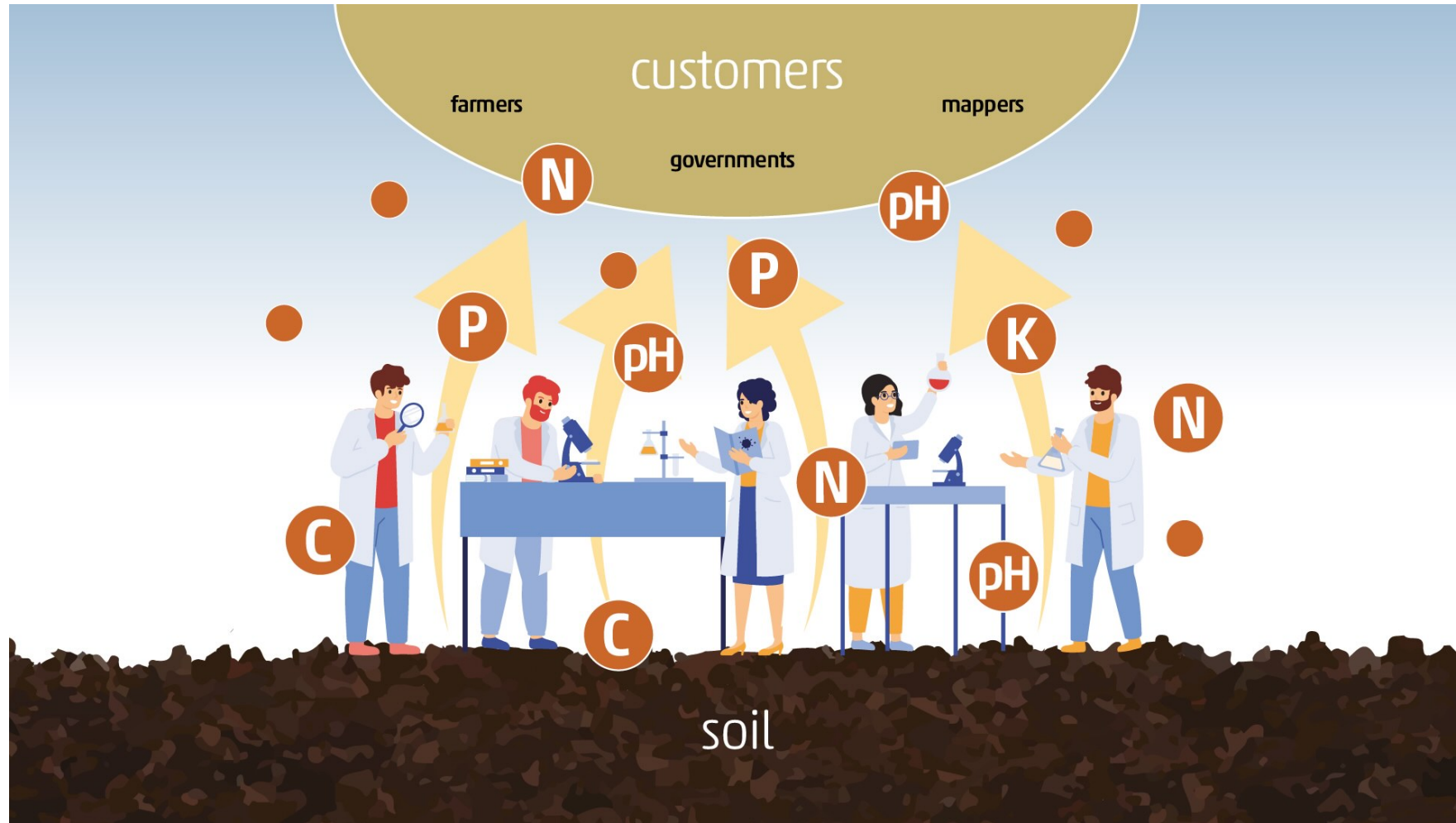
## GLOBAL SOIL PARTNERSHIP

### 11<sup>th</sup> Plenary Assembly

12-14 July 2023

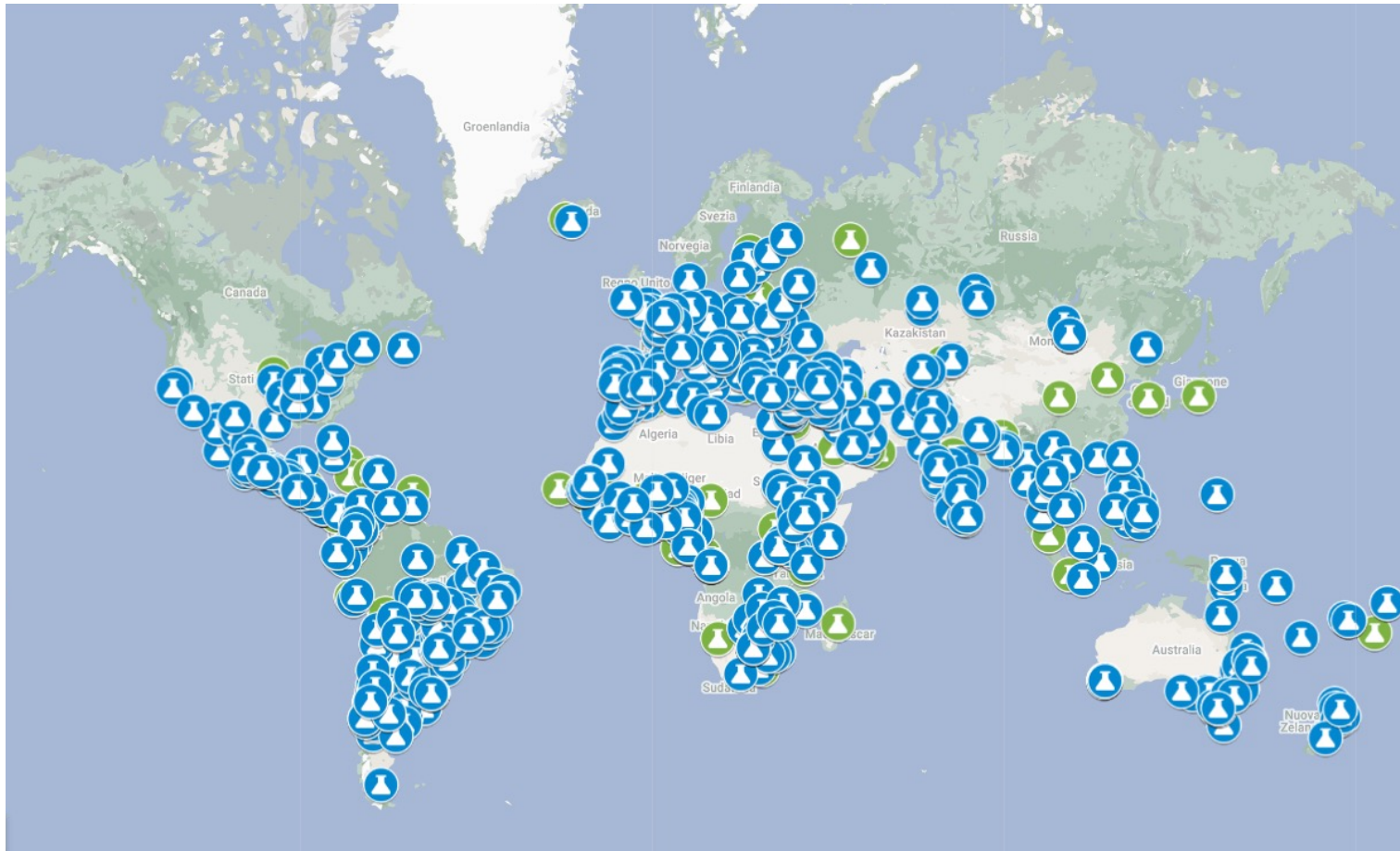


# Soil laboratories: where soil samples become data



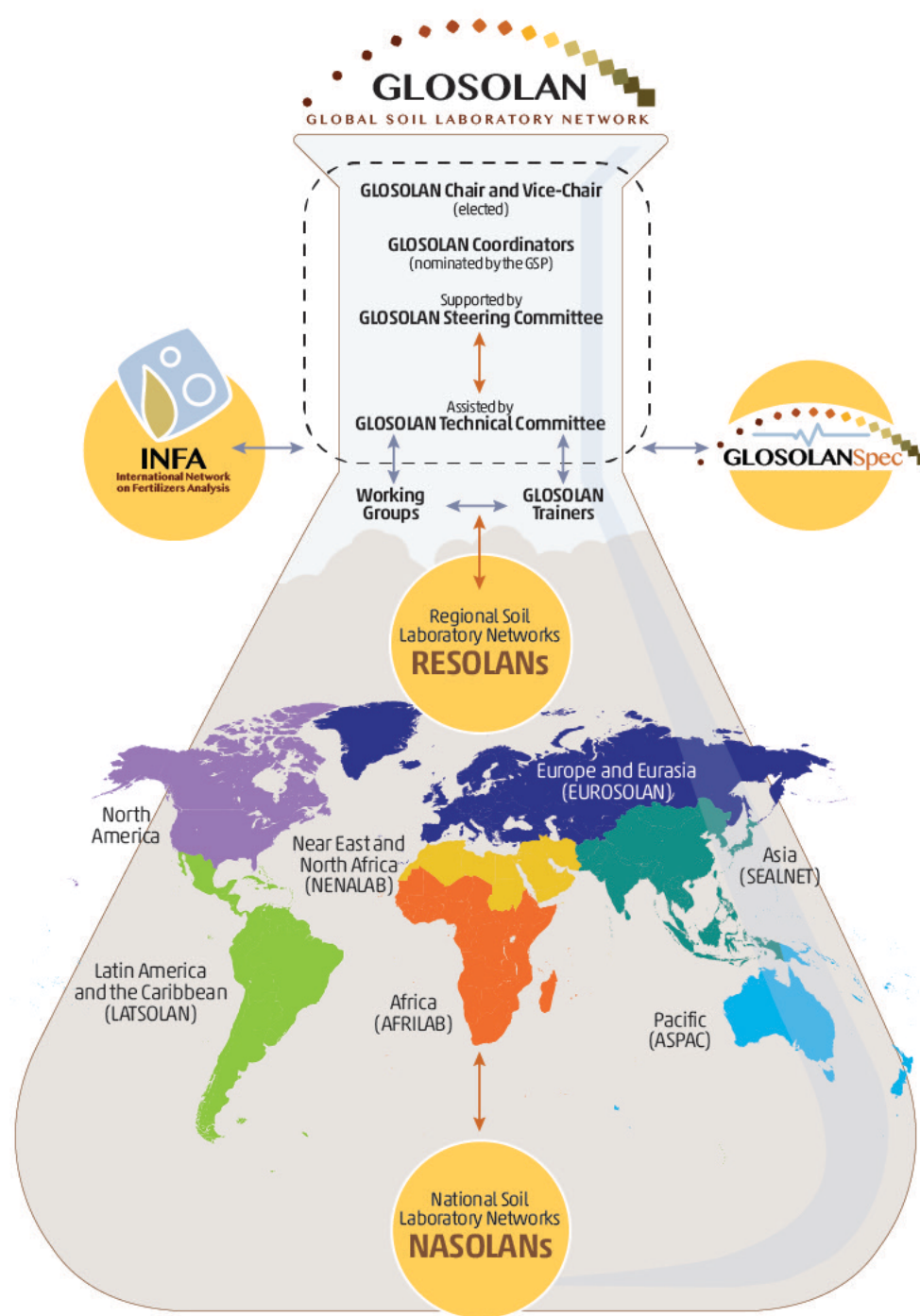


# GLOSOLAN: bringing soil laboratories to the forefront worldwide since 2017



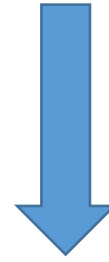
Currently grouping together around 1 000 soil testing institutions from over 155 countries



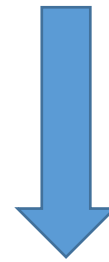


# We operate at all levels...

**GLOBAL**



**REGIONAL**



**NATIONAL**

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## Collaborative and participative approach ...



... where the most advanced laboratories help those who need to improve

# What are we working on?

- 1) Harmonization of Standard Operating Procedures (SOPs)
- 2) Provision of trainings and prepare awareness raising material on different topics
- 3) Organization of inter-laboratory proficiency tests (PTs)
- 4) Collaboration with other networks (INFA, NETSOB, INSAS, INSOP, INBS)
- 5) Collection of soil import regulations worldwide ([SIMPLE Database](#))
- 6) Share laboratory capacities and needs with the scientific communities, including details on data quality



# Harmonization of Standard Operating Procedures (SOPs)



*Globally harmonized protocols, with a bottom-up, collaborative and inclusive approach.*

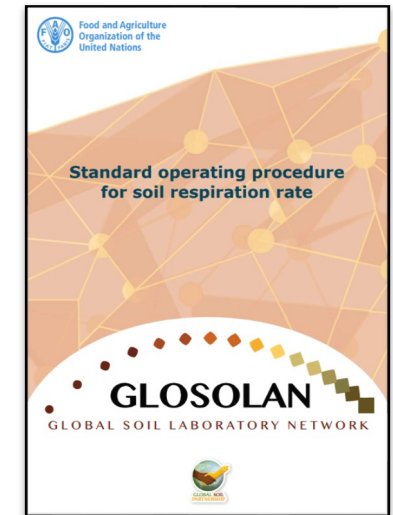
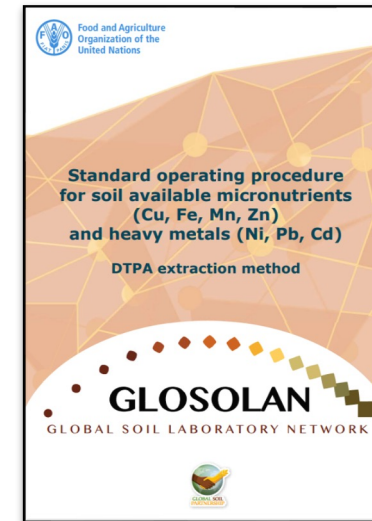
- Include step-by-step instructions, sections on health and safety, quality assurance and control (QA/QC),
- Contribute to the replicability of an analysis and to the quality and reliability of the data,
- Available online, for free and in several languages.

*New SOPs published in the last months:*

- Soil respiration rate
- Soil moisture by gravimetric method
- Cation exchange capacity and exchangeable bases
- Available micronutrients by DTPA extraction method
- Quasi total elements in soil by acid digestion including heavy metals

*Under final review:*

- Boron by hot water extraction
- Bulk density
- Particulate organic carbon by physical fractionation
- Microbial biomass



**Experts from the other GSP Technical Networks supported the harmonization and review of the SOPs from joint working groups**





**Almost 10 000 views in one year!**

**Walkley-Black method**  
*Titration and colorimetric method*

**Walkley-Black**  
*titration and colorimetric method*

**методом Уокли-Блэка**  
*титрованием и колориметрическим*



**SOLA**  
LABORATORIO



ALIANZA MUNDIAL POR EL SUELO



# Capacity building

- In-person training sessions
  - Djibouti, December 2022
  - Uzbekistan, May 2023
  - Dakar, October 2023
- Webinars
- Video training
- Guidelines

## Several topics covered:

- SOPs implementation
- Quality control and good practices
- Health and safety
- Equipment
- Soil spectroscopy



Uzbekistan, May 2023



Webinar on quality control, in Spanish, July 2022



Djibouti, December 2022



# GLOSOLAN global PT 2021-2022

- 240 laboratories from around 110 countries
- Targeted parameters: C, N, P (using GLOSOLAN SOPs)
- Each lab received a set of 10 homogenized (sterilized) soil samples (6 soil types/5 blind replicates)
- Thanks to the support of BGS (UK) and IRD (France)



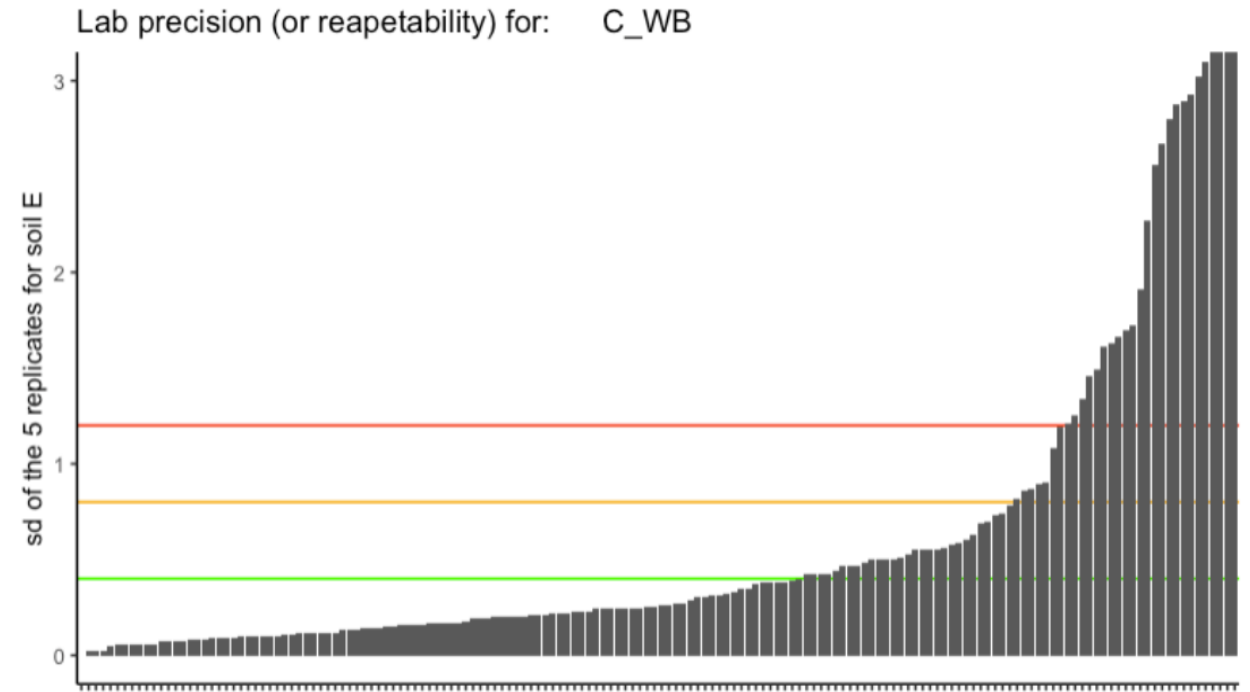
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# Outcomes

- Around half of the participating laboratories provided **precise result**. However, the **remaining half of the labs showed to have some problems and a consistent number of labs have serious problems with analytical accuracy and precision**
- GLOSOLAN needs to continue investing in harmonizing SOPs and assessing and monitoring laboratory performance through global, regional, and national PTs
  - Build the capacity to organize PTs
  - **Launch of 3 regional PT in 2023**
    - Eurasia (led by RUSOLAN, thanks to the support of PhosAgro)
    - Asia (led by the Philippines)
    - Africa+NENA (thanks to the support of BGS and IRD)
  - Launch of several national PTs
- High-performing laboratories have a key role to play in helping and training less successful laboratories on a regular basis.



Exchange of soil samples for scientific purposes remains a major issues in many countries



# GLOSOLAN initiative on soil spectroscopy (GLOSOLAN-Spec)



- Primer for soil spectroscopy: to introduce theory and concepts of soil spectroscopy at the beginner level (available in different languages)
- Training in soil spectral modelling in R (six sessions)
- Webinars with spotlight on state-of-art, research and discussion
- Launch of the International Capacity Development Group on Soil Spectroscopy (SoilSpecNet)



## UPCOMING TRAININGS

- Artificial intelligence and machine learning in soil spectroscopic modelling  
5 July 2023 | 9:00 CEST  
SPEAKERS: Zefang Shen and Raphael Viscarra Rossel  
LANGUAGE: English  
[Details of the event](#) | [REGISTRATION](#)

## PAST TRAININGS

- Soil Spectroscopy and Deep Learning-based modeling for decision-making in agricultural contamination  
3 March 2023 | 15:00 CEST  
SPEAKER: Franck Albinet  
LANGUAGE: English  
[Details of the event](#) | [WATCH the RECORDING](#) | [DOWNLOAD the PRESENTATION](#)
- Towards operational large-scale soil spectral libraries  
11 October 2022 | 14:30 CEST  
SPEAKER: Leonardo Ramirez-Lopez  
LANGUAGE: English  
[Details of the event](#) | [Presentation \(available soon\)](#) | [Video recordings](#)
- Soil sample preparation for MIR measurement. Is fine grinding necessary for accurate MIR predictions?  
07 September 2022 | 16:00 CEST  
SPEAKER: Dr Nuwan Wijewardane  
LANGUAGE: English  
[Details of the event](#) | [Presentation](#) | [Video recordings](#)
- Interpretation of mid infrared spectra of soil - Direct use of spectra to provide new insights

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# GLOSOLAN initiative on soil spectroscopy (GLOSOLAN-Spec)

## Next activities



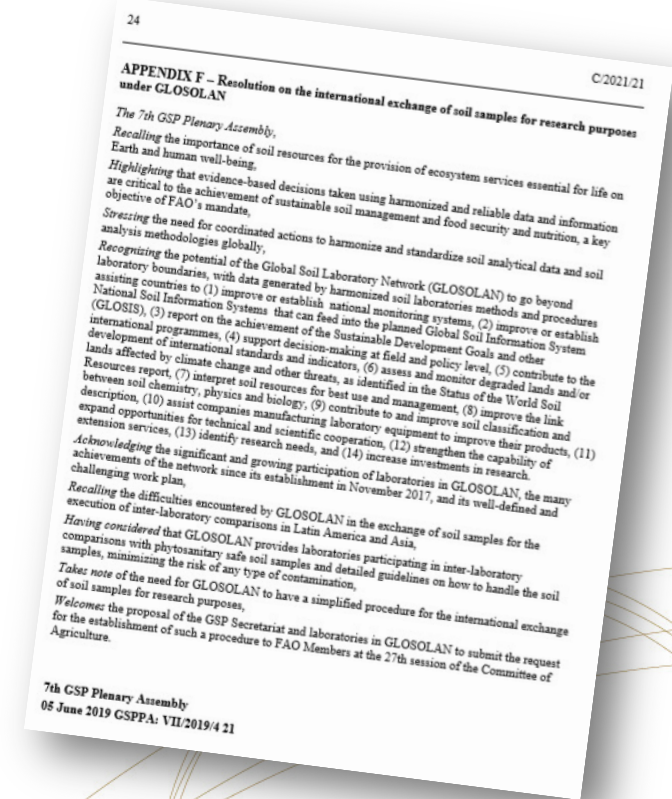
- Soil spectral hub (GSP/FAO)
- Guides to available soil spectral resources (existing open-source soil spectral libraries and soil spectral estimation services)
- Publishing of Standard Operating Procedures for soil spectroscopy using NIR and MIR
- Expand capacity building- webinars, and technical document in additional languages. Additional guides in the style of the primer
- Continue webinar series with spotlight on state-of-art, research and discussion



# Suggested actions for the GSP Focal Points



- Encourage national soil laboratories to **join the network, implement the Standard Operating Procedures** harmonized by GLOSOLAN, participate in **proficiency tests (PTs)**
- Invite resource partners to **support GLOSOLAN activities** and the National Soil Laboratory Networks (**NASOLANs**)
- Facilitate the implementation of the [Resolution on the international exchange of soil samples for research purposes](#) under GLOSOLAN, which was endorsed at the 27th Session of the FAO Committee on Agriculture (COAG), and promote the organization of national proficiency tests;
- Contribute with information on national legislations on the import/export of soil samples to further develop the **Soil Import Legislation database (SIMPLE)**;
- Encourage national soil laboratories to participate on the **Global Assessment of Soil Laboratories 2023**;
- Invite countries to consider developing actively **soil spectral laboratories, national soil spectral library and the estimation service**, under the framework of GLOSOLAN – Spec;
- Encourage institutions which already have developed soil spectral libraries and estimation services to **make them open** for research and decision-making purposes to other institutions.



*Thanks to the kind support of*



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*Thank you very much  
for your attention!*

