



**Food and Agriculture  
Organization of the  
United Nations**



# Report of the ninth meeting of the International Network of Soil Information Institutions (INSII)

REPORT OF THE NINTH MEETING OF THE INTERNATIONAL NETWORK  
OF SOIL INFORMATION INSTITUTIONS (INSII)

Teleconference, 7–9 November 2023

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

# Contents

Opening remarks	1
Adoption of agenda	1
1. The year behind (Q4 2023-Q4 2023)	1
2. GSP Action Framework (2030) and INSII	1
3. Global soil health index	2
4. Resource mobilization and the projects implemented by the INSII	2
5. Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase I	2
6. Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase II	3
7. Invited talk: Soil mapping and soil data management in Bangladesh	3
8. Invited talk: Liberian Soil Information System (LibSIS)	3
9. Invited talk: Soil mapping for resilient agrifood systems in Zambia (SoilFER)	4
10. Global Soil Information System (GloSIS) development	4
11. Invited talk: Supporting sustainable SIS development in countries	4
12. Global Symposium on Soil Information and Data (GSID'24)	4
13. The year ahead (2024)	5
14. Open discussion and closing	5
Annex I Meeting agenda	6
7 November 2023   12.00–15.00 CET	6
8 November 2023   12.00–15.00 CET	7
9 November 2023   12.00–13.00 CET	8
Annex II List of attendance	9
Annex III Overview of thematic working groups and its members	13

## Abbreviations

AF	Action Framework
CREA	Council for Agricultural Research and Analysis of Agricultural Economics
FAO	Food and Agriculture Organization of the United Nations
GBSmap	Global Black Soil Distribution Map
GLOSOLAN	Global Soil Laboratory Network
GloSIS	Global Soil Information System
GSASmap	Global Salt-affected Soils map
GSDP	Global Soil Doctors Programme
GSERmap	Global Soil Erosion map
GSNmap	Global Soil Nutrient and Nutrient Budget maps
GSOCmap	Global Soil Organic Carbon map
GSP	Global Soil Partnership
GSOCseq	Global SOC Sequestration Potential map
HiH	Hand-in-Hand Initiative
INSII	International Network of Soil Information Institutions
ITPS	Intergovernmental Technical Panel on Soils
KPI	key performance indicator
OEWG	Open-ended Working Group
PA	Plenary Assembly
SDGs	sustainable development goals
SDI	spatial data infrastructure
SIS	soil information system
SISLAC	Latin America and the Caribbean Soil Information System
SSM	sustainable soil management

## Opening remarks

The ninth meeting of the International Network of Soil Information Institutions (INSII) was conducted online from 7–9 November 2023. Luca Montanarella – serving as the Chair of INSII and representing the European Commission’s Joint Research Centre (EC-JRC) – initiated the meeting with a warm welcome to all attendees. He highlighted the unique role of INSII as a collaborative network of institutions, emphasizing the significance of voluntary participation and the collective effort to share valuable soil data with the Global Soil Partnership (GSP). Montanarella encouraged active participation and interaction throughout the meeting and expressed a desire to expand the network's reach, advocating for increased interinstitutional cooperation and the potential for multiple INSII representatives per country.

## Adoption of agenda

Luca Montanarella asked the participants if there were any objections regarding the proposed agenda. A guest presentation was moved to the next day. No comments were made regarding the content of the proposed agenda. The agenda (see [Annex I](#)) was adopted unanimously.

### 1. The year behind (Q4 2023-Q4 2023)

Isabel Luotto (GSP Secretariat) reviewed the significant milestones and developments achieved by the INSII network over the past year. This period was marked by notable advancements in key areas such as the Global Soil Information System (GloSIS) enhancements and effective resource mobilization strategies. Luotto also briefed the participants about the update and launch of the Harmonized World Soil Database (HWSD v.2.0). The network's engagement in capacity development was highlighted, showcasing a variety of workshop formats and educational initiatives. Preparations for the upcoming Global Symposium in 2024 were also discussed, emphasizing the GSP's commitment to global soil health and information dissemination.

### 2. GSP Action Framework (2030) and INSII

Yusuf Yigini (GSP Secretariat) outlined the strategic objectives and targets of the GSP Action Framework (GSP AF). The GSP AF aims at making the performance and progress of the GSP measurable by means of key performance indicators (KPI). SoilSTAT, the GSP platform for countries to report on soil indicators, alongside other KPIs specifically developed for the GSP AF, will play a crucial role in quantifying the GSP achievements. Furthermore, the development of a global soil health index (GSHI) has been kick-started. Yigini emphasized the crucial role of INSII in supporting the framework, particularly in relation to the GSP Action Framework (ISAF) working group's efforts in developing a robust indicator system. Several INSII members are already part of the ISAF working group (Annex III). INSII members not previously involved were encouraged to join the ISAF working group by directly contacting the GSP secretariat. This system is pivotal for assessing progress in sustainable soil management (SSM), aligning with the sustainable development goals (SDGs), and enhancing global soil health.

### 3. Global soil health index

Marcos Angelini (GSP Secretariat) presented a potential approach for the establishment of a global soil health index (GSHI). Angelini emphasized the importance of this index as a tool for assessing soil health across various scales. The presentation provided a detailed overview of the methodology for developing the index, its role in aiding policymakers, and the challenges in creating a universally applicable soil health indicator. The presentation also showcased working examples, like the EU Soil Observatory's Soil Health Dashboard, and discussed the complexity of combining soil indicators. The importance of aligning soil functions with environmental services to assess soil health beyond productivity was highlighted, offering a comprehensive view of soil's contribution to ecosystem services and well-being.

The discussions highlight the complexities involved in creating a universally applicable and meaningful soil health assessment tool, integrating various soil indicators, and aligning them with environmental services. The soil health index approach developed by the JRC was mentioned as an alternative, which is based on the concept of convergence of evidence. This approach was highlighted to be more suitable for monitoring soil health.

### 4. Resource mobilization and the projects implemented by the INSII

The presentation *Resource mobilization & INSII* by Yusuf Yigini highlighted INSII's progress over more than seven years as a flagship network of the GSP. It emphasized INSII's role in enhancing the GSP and FAO's visibility through data-driven policies and projects. Key achievements include global capacity development programmes, soil information systems like NSIS and GloSIS, and successful resource mobilization from countries and donors. The presentation also showcased various INSII-implemented projects across countries, enhancing data-driven soil frameworks and supporting SSM.

During the discussion remarks centred on INSII's role in resource mobilization, project implementation, and the broader objectives of the GSP. The GSP Secretariat underscored its availability to support countries in the formulation and implementation of projects on soil data and information.

### 5. Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap)

#### Phase I

Marcos Angelini (GSP Secretariat) briefed the INSII members on the progress of the Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase I. The GSNmap products are being developed following a two-phase approach:

- Phase I: development of soil nutrient and associated soil property maps;
- Phase II: quantification, analysis, projections of nutrient budgets for agricultural land use systems at national, regional, and global scale.

The methodological approach includes a digital soil mapping (DSM) approach based on a machine learning algorithm. Due to data and human capacity limitations the implementation is taking longer than expected. The deadline for national submissions was 31 August 2023, with 19 countries having

already submitted and 19 still in progress. The official launch of the GSNmap has been postponed to the twelfth GSP Plenary Assembly scheduled for the summer of 2024.

## 6. Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase II

Marcos Angelini briefed the meeting participants on the progress of the implementation of Phase II of the GSNmap. Global soil nutrient budgets will be assessed by considering soil nutrient stocks and the impacts of erosion and leaching. Angelini emphasized the need for creating a baseline for evaluating nutrient budgets and soil degradation, with a country-driven approach. The GSNmap Working Group is comprising 24 soil nutrition experts, has supported the process by engaging discussions on potential approaches. The presentation also touched on various input/output tiers for different data sets like synthetic fertilizers, manure, nitrogen deposition, and biological fixation, and addressed nutrient loss aspects like erosion and nitrogen leaching. The follow-up plan included finalizing technical specifications and starting the second phase in the second half of 2024.

## 7. Invited talk: Soil mapping and soil data management in Bangladesh

Manzurul Hoque's (Soil Resource Development Institute, Bangladesh) presentation focused on soil mapping and soil data management in Bangladesh, detailing the progress under a project funded by the Asian Food and Agriculture Cooperation Initiative (AFACI). The presentation included the history of soil data and map generation in Bangladesh, emphasizing recent updates in soil profile databases and the harmonization of soil information. Additionally, it highlighted the application of the World Reference Base (WRB) for soil resources and the development of tools for monitoring soil quality changes and SSM. The presentation also provided background on the AFACI project and its contributions to the advancements in soil mapping and data management in Bangladesh.

## 8. Invited talk: Liberian Soil Information System (LibSIS)

Keita Gelbokai's (FAO Liberia) presented the main achievements of the TCP project *Strengthening Soil Analysis and Information Systems in Liberia*. It covered the rationale behind the project, highlighting the challenges in soil productivity and data availability in Liberia. The objectives included enhancing soil analysis and data management capabilities to support evidence-based decision-making. Key achievements comprised improvements in national capacity for soil laboratory analysis, soil data management, and the establishment of the Liberian Soil Information System (LibSIS). The presentation outlined the project's implementation, including training in soil analysis and the procurement of laboratory equipment, emphasizing its impact on sustainable land use and climate change adaptation.



## 9. Invited talk: Soil mapping for resilient agrifood systems in Zambia (SoilFER)

Isabel Luotto presented the Zambian component of the project *Soil mapping for resilient agrifood systems in Central America and sub-Saharan Africa* (SoilFER). The project, spanning 48 months (Q2 2023 to Q2 2027), was backed by the United States of America Department of State. The SoilFER project adopts a holistic approach, addressing short-, medium-, and long-term solutions for soil health and fertility through SSM. It aims to provide farmers and the government with data-driven decision-making tools at both national and farm levels, promoting SSM practices to improve soil health. The project is also dedicated to fostering a culture of ownership and self-reliance within Zambia, establishing sustainable soil–crop systems to empower the government in supporting its farmers.

## 10. Global Soil Information System (GloSIS) development

Yusuf Yigini presented the progress and recent developments of the GloSIS. Key points included the outline of national soil information systems (NSIS) that have been launched or are in progress. The GloSIS discovery hub, now under the FAO domain, is technically supported by FAO's IT division (CSI) and the GeoSpatial Unit. The system utilizes CKAN for data and metadata management and combines TerraJS and GeoServer for map services. A template node for NSIS – developed under the SOILCARE project – is proposed to serve as a default for countries. This project is implementing a regional SIS (RSIS), CarSIS, in seven Caribbean countries. Yigini also clarified that GloSIS will follow the ISO metadata standard, with ongoing exploration of CKAN's harvesting extension for data collection. The collaboration between CSI and the GeoSpatial Unit is part of FAO's long-term commitment to centralize data collection.

## 11. Invited talk: Supporting sustainable SIS development in countries

Fenny van Egmond (ISRIC) presented the project *Supporting sustainable SIS development in countries* funded by the Bill and Melinda Gates Foundation. The presentation highlighted the value of SIS in decision-making and identified challenges in their development and use. Key points included the need for country-specific SIS designs, lessons from past successes and failures, and the development of a replicable framework for SIS design. The presentation emphasized a user-focused approach, considering in-country capacity and the environment, crucial for sustainable SIS and country development.

## 12. Global Symposium on Soil Information and Data (GSID'24)

Yusuf Yigini, on behalf of Isabel Luotto, presented plans for the upcoming Global Symposium on Soil Information and Data (GSID'24). The symposium aims to enhance soil data utilization for sustainable

development. It will address themes like soil data for policy and decision-making, data sharing, challenges in standardization, and advances in soil data collection. The event plans to incorporate diverse perspectives, fostering cross-disciplinary collaboration and actionable outcomes. The symposium will take place in autumn 2024.

During the discussion the following suggestions were made:

- Split theme one into two separate ones;
- combine theme three and four;
- involve the private sector;
- make the themes broader to include a wider audience;
- make soil information approachable to non-soil experts;
- tackle the topic of effectively communicating uncertainty for end users; and
- include topics connected to non-agricultural land use systems.

### 13. The year ahead (2024)

Yusuf Yigini presented upcoming initiatives and activities planned for 2024. Key points included a timeline of important events and activities, such as the review of the GSID'24 concept note, the GSP Action Framework, and technical specifications for GSNmap Phase II. The presentation provided a comprehensive overview of the planned milestones and deliverables for the upcoming year, emphasizing the significant progress and continued efforts in soil information systems.

### 14. Open discussion and closing


During the open discussion the following points were raised and agreed by the members of INSII:

- to establish a dedicated working group for the development and establishment of GloSIS; and
- to resume the joint work and progress made by the GSP and ISRIC.

After a time slot allocated to open discussion, Luca Montanarella closed the ninth INSII meeting. He announced that the next meeting may take place in hybrid or in-person modality. Yusuf Yigini thanked all INSII members for their participation and contributions and stated that the key meeting documents would be shared soon. Luca Montanarella thanked the GSP Secretariat for the preparation of the meeting and making the materials available. He reiterated that INSII had a key role as data provider to the GSP and should continue to contribute to the work of the GSP, despite existing challenges.

## Annex I Meeting agenda

7 November 2023 | 12.00–15.00 CET

Time (CET)	Topic & speaker
12.00–12.15	Opening & adoption of the agenda <i>Luca Montanarella - Chair</i>
12.15–12.45	The year behind <i>Isabel Luotto (GSP Secretariat)</i>
12.45–13.00	Q&A
13.00–13.15	
13.15–13.30	GSP Action Framework (2030) and INSII <i>Yusuf Yigini (GSP Secretariat)</i>
13.30–14.00	Global Soil Health Index <i>Marcos Angelini (GSP Secretariat)</i>
14.00–14.10	Q&A
14.10–14.30	Invited talk: Soil mapping and soil data management in Bangladesh <i>A.F.M. Manzurul Hoque, AFACI Project, INSII, Bangladesh</i>
14.30–14.50	
14.50–15.00	Closing <i>Luca Montanarella</i>

## 8 November 2023 | 12.00–15.00 CET

Time (CET)	Topic & speaker
12.00–12.10	Opening <i>Luca Montanarella</i>
12.10–12.40	The Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase I <i>Marcos Angelini</i>
12.40–13.10	The Global Soil Nutrient and Soil Nutrient Budget maps (GSNmap) Phase II <i>Marcos Angelini</i>
13.10–13.30	Invited talk: Soil mapping and soil data management in Bangladesh <i>A.F.M. Manzurul Hoque, AFACI Project, INSII, Bangladesh</i>
13.30–14.00	Invited talk: Liberian Soil Information System (LibSIS) <i>Keita Gelboikai, FAOLIB</i>
14.00–14.30	Invited talk: Soil mapping for resilient agrifood systems in Zambia (SoilFER) <i>Isabel Luotto</i>

## 9 November 2023 | 12.00–13.00 CET

Time (CET)	Topic & speaker
12.00–12.05	Opening <i>Luca Montanarella</i>
12.05–12.30	GloSIS development <i>Yusuf Yigini</i>
12.30–12.50	Invited talk: Supporting sustainable SIS development in countries <i>Pascale Bodevin (CABI) &amp; Fenny van Egmond (ISRIC)</i>
12.50–13.15	Global Symposium on Soil Information and Data (GSID'24) <i>Isabel Luotto</i>
13.15–13.30	Discussion: GSID'24
13.30–13.50	
13.50–14.15	The year ahead (2024) <i>Yusuf Yigini</i>
14.15–14.30	Open discussion
14.30	Closing <i>Luca Montanarella</i>

CHECK [HERE](#) THE DETAILS OF THE EVENT

## Annex II List of attendance

Surname	Forename	Institution	Country
Ágústsdóttir	Anna María	Soil Conservation Service of Iceland	Iceland
Angelini	Marcos	Food and Agriculture Organization of the United Nations (FAO) - Global Soil Partnership (GSP)	Argentina
Arachchige	Matheesha Liyana	Cranfield University	United Kingdom of Great Britain and Northern Ireland
Attia	Rafla	Ministry of Agriculture	Tunisia
Bautista Montealegre	Luis Gabriel	Agrosavia	Colombia
Bazarradnaa	Enkhtuya	Institute of Plant and Agricultural Sciences	Mongolia
Benedetti	Filippo	FAO - GSP	Italy
Biddoccu	Marcella	Italian National Research Council (CNR)	Italy
Bispo	Antonio	INRAE	France
Bolaños Benavides	Martha Marina	Agrosavia	Colombia
Bosma	Andries	ISRIC World Soil Information	Netherlands (Kingdom of the)
Choneea	Mahen	National Parks and Conservation Service	Mauritius
Collett	Anneliza	Department of Agriculture, Land Reform, and Rural Development (DALRRD)	South Africa
de Souza	Gabrielle	Ministry of Agriculture, Land and Fisheries	Trinidad and Tobago
Egmond	Fenny van	ISRIC World Soil Information	Netherlands (Kingdom of the)
Egueh	Mohamed	Djibouti Centre for Studies and Research (CERD)	Djibouti
Elmobarak	Abdelmagid Ali	Land and Water Resource Centre (LWRC) - Agricultural Research Corporation (ARC)	Sudan
Emiliano	Maria	FAO - GSP	Italy
Fantappié	Maria	Council for Agricultural Research and Analysis of Agricultural Economics (CREA)	Italy
Ferguson	Rich	USDA - NRCS	United States of America
Ferro Vazquez	Maria	FAO - GSP	Spain
Flores	Andrew	Bureau of Soils and Water Management	Philippines
Gatere	Lydia	FAO - GSP	Uganda

Golozubov	Oleg	Lomonosov Moscow State University	Russian Federation
Guevara	Mario	Geosciences Center - National Autonomous University of Mexico Juriquilla Campus	Mexico
Guste	Dace	Ministry of Agriculture	Latvia
Hladkikh	Yevheniia	National Scientific Centre "Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky"	Ukraine
Huber	Sigbert	Environment Agency	Austria
Ibelles Navarro	Alejandro Roberto	INEGI	Mexico
Kamara	Alie	Njala University Quality Control Laboratory	Sierra Leone
Khamis	Nuha	Land and Water Resource Centre (LWRC) - Agricultural Research Corporation (ARC)	Sudan
Koparan	Muhammed Halil	Ministry of Agriculture and Forestry, General Directorate of Agricultural Research and Policies (TAGEM)	Türkiye
Kozák	Josef	Czech University of Life Sciences	Czechia
Lebed	Vitalii	National Scientific Centre (NSC) "Institute for Soil Science and Agrochemistry Research Named After O.N. Sokolovsky" (ISSAR)	Ukraine
Leenaars	Johan	ISRIC World Soil Information	Netherlands (Kingdom of the)
Lindbo	David	USDA - NRCS	United States of America
Lobb	David	ITPS - University of Manitoba	Canada
Luotto	Isabel	FAO - GSP	Germany
Luts	Dries	Department of the Environment and Spatial Development	Belgium
Montanarella	Luca	European Commission (EC) - Joint Research Centre (JRC)	European Union
Madenoglu	Sevinc	Ministry of Agriculture and Forestry, General Directorate of Agricultural Research and Policies (TAGEM)	Türkiye
Mainka	Moritz	FAO - GSP	Germany
Makowski	Vera	Thünen Institute	Germany
Moshia III	Matshwene E.	ITPS - Institute for Soil, Climate, and Water of the Agricultural Research Council	South Africa
Muntyan	Aleksandr	Institute of Pedology, Agrochemistry and Soil Protection	Republic of Moldova

Olivera Sanchez	Carolina	FAO - GSP	Colombia
Omuto	Christian	FAO - GSP	Kenya
Owusu Ansah	Alexander	Council for Scientific and Industrial Research (CSIR) - Soil Research Institute (SIR)	Ghana
Pattanathaworn	Wattana	Land Development Department	Thailand
Pedraza Rute	Rafael Antonio	Agrosavia	Colombia
Chatanga	Peter	National University of Lesotho	Lesotho
Pioli	Silvia	FAO - GSP	Italy
Ramakhanna	Selebalo	Department of Agricultural Research	Lesotho
Ramos Ramos	Humberto	INEGI	Mexico
Rey	Juan Carlos	National Agricultural Research Institute	Venezuela
Rodica	Sîrbu	Institute of Pedology, Agrochemistry and Soil Protection "Nicolae Dimo"	Republic of Moldova
Rodriguez Eugenio	Natalia	FAO - GSP	Spain
Rodriguez Jimenez	Lady Marcela	Agustín Codazzi Geographic Institute (IGAC); Institute of Hydrology, Meteorology and Environmental Studies of Colombia - IDEAM; Colombian Agricultural Research Corporation Agrosavia	Colombia
Roecker	Stephen	USDA - NRCS	United States of America
Rousseva	Svetla	Institute of Soil Science Agrotechnology and Plant Protection "N. Poushkarov"	Bulgaria
Rozloga	Iurii	Institute of Pedology, Agrochemistry and Soil Protection "Nicolae Dimo"	Republic of Moldova
Schulz	Guillermo	National Institute of Agricultural Technology (INTA)	Argentina
Simões	Margareth	Brazilian Agricultural Research Company (EMBRAPA)	Brazil
Skalský	Rastislav	National Agricultural and Food Centre	Slovakia
Šmitiņa	Guna	State Plant Protection Service Republic of Latvia	Latvia
Stanco	Giulia	FAO - GSP	Italy
Stendahl	Johan	Swedish University of Agricultural Sciences	Sweden
Sulaeman	Yiyi	BRIN, Research Center for Geospatial	Indonesia
Tong	Yuxin	FAO - GSP	China
Ustinov	Sergejus	FAO - GSP	Ireland
Van Liedekerke	Marc	JRC-ISPRA	Europe



Vargas Garcia	Cesar Augusto	Agrosavia	Colombia
Wills	Skye	USDA - NRCS	United States of America
Wilson	Peter	CSIRO	Australia
Yigini	Yusuf	FAO - GSP	Türkiye
Yildiz	Hakan	Republic of Türkiye Ministry of Agriculture and Forestry - Soil, Fertilizer and Water Resources Central Research Institute	Türkiye
Zehavi	Maya	Ministry of Agriculture and Rural Development	Israel

## Annex III Overview of thematic working groups and its members

[Click here to access the overview](#)