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## Global Soil Partnership Plenary Assembly

### Ninth session

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**Progress of the GSP Technical Networks: for information and decision  
(GSPPA: IX/2021/9)**

#### Executive Summary

- The International Network of Soil Information Institutions (INSII) is the network coordinating all soil mapping/information activities under the aegis of the Global Soil Partnership (GSP). Its ultimate goal is the establishment of the Global Soil Information System (GloSIS).
- The GSP Secretariat and INSII have developed and successfully tested the country-driven approach for GloSIS global soil information products. This approach places emphasis on country-level activities and soil information and data ownership. The GLOGIS country driven global datasets include the Global Soil Organic Carbon Map (GSOCmap), the Global Soil Salinity Map (GSSmap), the Global Soil Organic Carbon Sequestration Potential Map (GSOCseq), the Global Black Soil Distribution Map (GBSmap) and the Global Soil Erosion Map (GSERmap).
- GSOCmap was released in 2017 and updated in 2019 and 2020. Other products are currently in different stages of development: GSOCseq is being launched during this 9th GSP Plenary Assembly, while the GSSmap will be launched in October 2021
- To date, the GSP's Soil Information and Data Capacity Development Programme has reached more than 1000 national experts from 140 countries with training sessions on soil data management, digital soil mapping, soil modelling and product oriented (GSOCmap, GSSmap, GSOCseq, GBSmap).
- The Global Soil Laboratory Network (GLOSOLAN) was established in 2017 to build and strengthen the capacity of laboratories in soil analysis and to respond to the need for harmonizing soil analytical data. The network is currently made up of around 700 soil laboratories operating in more than 150 countries.
- During 2020 and 2021, the Regional Soil Laboratory Networks (RESOLANs) of Africa, Asia, Eurasia and Europe, Latin America, and the Pacific organized their annual meetings and revised

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their work plans. The RESOLAN for the Near East and North Africa (NENA) region was more recently established.

- The establishment of National Soil Laboratory Networks (NASOLANs) was also encouraged by the creation of an online database and the publication of supportive documents.
- Ten new Standard Operating Procedures (SOPs) were harmonized and published, and are currently under translation.
- GLOSOLAN provided new equipment to soil laboratories operating in: Botswana, Colombia, Costa Rica, Dominican Republic, Ecuador, Georgia, India, Iran, Jamaica, Kenya, Mexico, Peru, the Philippines, Republic of North Macedonia, Thailand, Ukraine, Vietnam and Zambia.
- An online database (SIMPLE) was launched in June 2020 to report information about soil import regulations for each country.
- The first plenary meeting of GLOSOLAN initiative on soil spectroscopy was held in September 2020 to set up capacity building activities and to develop a Global Soil Spectral Calibration Library.
- As endorsed by the 8th Plenary Assembly, the [International Network on Fertilizer Analysis \(INFA\)](#) was established in December 2020, as a sub-network of GLOSOLAN in the context of implementation of the International Code of Conduct for the Sustainable Use and Management of Fertilizers. It aims to standardize methods and protocols for the analysis of fertilizers.
- The International Network of Black Soils (INBS) was established in 2017 under the aegis of the Global Symposium on Soil Organic Carbon.
- Since 2020, the International Network of Black Soils (INBS) is focused on the preparation of the Global Status of Black Soils report and the Global Black Soils map (GBSmap). Both activities follow a country-driven and inclusive framework engaging INBS members, national experts, the Intergovernmental Technical Panel on Soils (ITPS) and GSP Secretariat.
- The International Network of Salt-Affected Soils (INSAS) was established in 2019. In April 2021, the first meeting of the INSAS network (<http://www.fao.org/3/cb4954en/cb4954en.pdf>) took place in a virtual format and the workplan was formulated and its governance established.

### **Suggested actions by the GSP Plenary Assembly**

The Plenary Assembly may wish to:

#### **INSII**

- welcome the efforts made by the GSP to raise awareness on data-driven and evidence-based decision making;
- appreciate the development of the Global Soil Salinity Map (GSSmap) and Global Soil Organic Carbon Sequestration Potential Map (GSOCseq) and Global Black Soil Distribution Map (GBSmap);
- encourage the further development of GloSIS and National Soil Information Systems;
- urge countries to prepare national maps as per the technical specifications;
- in view of substantial requirements to improve technical and technological capacities in countries, invite resource partners to invest on capacity development on soil information;

- recognize the need for the INSII and the GSP Secretariat to continue developing country-driven global data products on soil threats and basic soil properties including the soil nutrient budgets mapping, especially as contributions to the 2022 World Soil Day (WSD) theme dedicated to Soil fertility and soils for nutrition;
- encourage a major update of the Global Soil Organic Carbon Map for additional depths and expect INSII and GSP Secretariat to take necessary steps to that end; and
- call on GSP Secretariat to host and maintain the elements of GloSIS SDI (Spatial Data Infrastructure) and GloSIS data products (country-driven global maps, GloSIS Discovery Hub) considering FAO's enhanced capacity on spatial infrastructure and services.

#### **GLOSOLAN**

- encourage soil laboratories to join the network and raise awareness of the role they played in producing reliable and comparable soil data;
- invite countries which did not do so to date to nominate National Reference Laboratories;
- support soil laboratories and the National Reference Laboratories operating in each country to establish and/or strengthen their National Soil Laboratory Networks and support the implementation of their activities (e.g. national proficiency test) by providing technical and financial support;
- urge the wide adoption/use of the Resolution on the international exchange of soil samples for research purposes under GLOSOLAN, as agreed during the 27<sup>th</sup> Session of the FAO Committee on Agriculture;
- encourage GLOSOLAN to develop and keep the SIMPLE (Soil Import Legislation) database updated including the section on fertilizers samples;
- stress the need to promote further GLOSOLAN publications and technical material, such as guidelines and Standard Operating Procedures (SOPs) in order to standardize the methodologies adopted by soil laboratories around the world; and
- invite the identification of national experts to be potentially involved as trainers and advisors for GLOSOLAN activities (training sessions, video lessons, etc.).

#### **INFA**

- encourage (via support from GSP Focal Points) soil laboratories and other key stakeholders to join INFA and implement agreed activities including harmonization, policy and regulations; and
- invite INFA to identify gaps and priority needs in terms of enhancing/building capacities.

#### **INBS**

- encourage countries to join the International Network of Black Soils according to the definition of black soils; and
- invite countries and partners to contribute actively in the preparation of the Global Status of Black Soils report and the Global Black Soils Distribution Map (GBSmap).

#### **INSAS**

- encourage countries facing soil salinity issues to join INSAS and participate in the different activities of the network to sustainably manage these soils and restore them where needed.

## 9.1 International Network of Soil Information Institutions (INSII)

1. INSII is the network coordinating all soil mapping/information activities under the aegis of the Global Soil Partnership (GSP). Its ultimate goal is the establishment of the Global Soil Information System (GloSIS). GloSIS is aimed at empowering countries to develop their national soil information systems and making soil data available, harmonised and exchangeable. The main principles of the proposed structure are being decentralized, federated, having national ownership, being light and affordable, open source, and country-driven.
2. The Sixth Workshop of the International Network of Soil Information Institutions (INSII) was held online to ensure safety of all participants in the context of the COVID-19 pandemic, from 7 to 9 October, 2020. The meeting reviewed the progress and status on the implementation of Pillar 4 Global Implementation Plan, GloSIS and its data products, and discussed the implementation of future activities ([INSII-VI/20/Report](#)).
3. The first implementation period of Pillar 4 (Soil Information and Data) expired in 2020.
4. The 8th GSP Plenary Assembly extended the Pillar 4 implementation period until the 9th GSP Plenary Assembly and mandated INSII for the further steps.
5. During the 6th INSII Meeting, Pillar 4 Working Group was mandated to finalize the new Pillar 4 Global Implementation Plan by the 9th GSP Plenary Assembly according to the suggestions made by the INSII members. However, considering the mandate of the 8<sup>th</sup> GSP Plenary Assembly on the Implementation of the Recommendations of the GSP Evaluation, the development of a new GSP Action Framework (moving out from pillars) and ongoing assessment of the implications of an eventual institutionalization of the GSP, the GSP Secretariat and the INSII Chairperson advised to suspend the development of the new implementation plan for GSP Pillar 4 until the plenary discussion of Item **GSPPA/IX/2021/2** takes place.

### 9.1.1 GloSIS development, maintenance, hosting

6. Pillar 4 Working Group decided to divide GloSIS development in 2 phases: short-term goals – to help countries to organize and share their data through national soil information systems (thus building GloSIS 1.0 as a platform that facilitates search of data); long-term goals – to establish a fully functional system for harmonized data storage and exchange with several add-ons/plugins using standards and the latest IT solutions for optimal functionality (GloSIS 2.0).
7. The GloSIS 2.0 will incorporate more functionality such as standardised data exchange. Data exchange standards are currently under development.
8. GloSIS 1.0 development started in the last quarter of 2020 with beta testing countries (Australia, Bolivia, Canada, Cape Verde, Fiji, Gambia, Indonesia, Israel, Italy, Mongolia, Morocco, Niger, Papua New Guinea, the Philippines, Senegal, Sudan, Tunisia, Turkey, Ukraine, and Zimbabwe) that expressed their interest in the 6th INSII meeting.
9. Two GloSIS technical development meetings were organised in January and April 2021 with beta testing countries and first versions of the GloSIS national information system software and the instructions guide were rolled out.
10. A Beta version of the GloSIS Discovery Hub has been developed. The Discovery Hub will be a central portal that connects the national soil information systems (NSISs) and serves thematic products to increase discoverability of ways to find the soil data. It will be easily accessible on

the internet. The hub will allow the users to search metadata, find soil datasets and access the data that are hosted through all connected national nodes or NSISs.

11. In parallel, the GSP Secretariat has been supporting members and regional soil partnerships to establish national and regional soil information systems. To date, Afghanistan (SISAf), Armenia (ArmSIS), Cambodia (CamSIS), Lesotho (LeSIS), Latin America and the Caribbean (SISLAC), Macedonia (MaSIS), and Sudan (SuSIS) established their national and regional soil information systems with the support of GSP donors and FAO.
12. Thirteen more countries (Bangladesh, Bhutan, Cambodia, Indonesia, Kyrgyzstan, Lao PDR, Mongolia, Myanmar, Nepal, the Philippines, Sri Lanka, Thailand, and Viet Nam) will shortly establish or modernize their national soil information systems with the financial support of Rural Development Administration, Republic of Korea.
13. Over the last years the technical capacity at FAO has been significantly increased. The GSP Secretariat is now able to develop fast in-house solutions with relevant FAO divisions and initiatives including FAO's Information Technology Services Division (CSI), Land and Water Division (NSL) Geospatial Unit and FAO Hand-in-Hand (HiH) Initiative. The Hand in Hand initiative has recently developed a spatial data infrastructure and a platform to support the implementation of the Sustainable Development Goals (SDGs), SDG1 and SDG 2, using the most sophisticated tools available, including advanced geo-spatial modelling and analytics.
14. Considering the existing in-house technical and technological capacity, the further development of the GloSIS spatial data infrastructure and hosting GloSIS components (GSP's country-driven global maps, GloSIS Discovery Hub) would be undertaken and maintained by FAO. GloSIS coordination, management and maintenance would be carried out by the GSP Secretariat, relevant FAO divisions and overseen by INSII.

### **9.1.2 Global Soil Organic Carbon Map (GSOCmap)**

15. The first version of the GSOCmap was launched in 2017 as v1.0 and updated in 2019 and 2020. The current version of the GSOCmap is v1.5.
16. The current version of the GSOCmap is depicting global soil organic carbon stocks for the top-soil (0-30 cm). Considering the importance of the subsoil soil organic carbon stocks, a major update may be needed to update the map with additional depth layers down to 1-2 meters.

### **9.1.3 Global Soil Organic Carbon Sequestration Potential Map (GSOCseq)**

17. The preparation of the Global Soil Organic Carbon Sequestration Potential Map (GSOCseq) was mandated by the 6th GSP Plenary Assembly to the GSP Secretariat.
18. National GSOCseq submissions consist of 29 layers (1km resolution over agricultural areas).
19. The development process has been enhanced by a comprehensive capacity development program which supported countries to produce their national GSOCseq layers. A set of technical documentation and a capacity building toolkit were prepared which consist of GSOCseq Technical Specifications and Country Guidelines, GSOCseq Technical Manual and GSOCseq Training Material.
20. The GSP Secretariat organized seven regional training activities which reached 390 national experts from 140 countries. These were followed by individual sessions to support national experts in finalizing national GSOCseq layers.

21. To date 36 countries have produced their GSOCseq layers with their own capacity or jointly with the GSP-Secretariat (the Argentine Republic, the People's Republic of Bangladesh, the Kingdom of Bhutan, Canada, the Republic of Cabo Verde, the Kingdom of Cambodia, the Republic of Costa Rica, the Republic of Cuba, the State of Eritrea, the Republic of Estonia, the Federal Democratic Republic of Ethiopia, the Republic of Finland, the French Republic, the Federal Republic of Germany, the Hellenic Republic, the Kingdom of Lesotho, the United Mexican States, the Federal Republic of Nigeria, the Republic of North Macedonia, the Sultanate of Oman, Palestine, the Republic of the Philippines, the Republic of Korea, the Republic of Moldova, the Russian Federation, the Republic of Senegal, the Slovak Republic, the Republic of South Africa, the Democratic Socialist Republic of Sri Lanka, the Republic of the Sudan, the Swiss Confederation, the Republic of Turkey, the United Arab Emirates, the United States of America, the Eastern Republic of Uruguay, and the Socialist Republic of Viet Nam), 19 countries requested the secretariat to produce their GSOCseq datasets by the GSP Secretariat (the Republic of Armenia, the Kingdom of Bahrain, the Republic of Croatia, the Republic of El Salvador, the Republic of Guatemala, the State of Israel, Japan, the Lebanese Republic, the Republic of the Marshall Islands, Mongolia, the Sultanate of Oman, the Republic of Peru, the Independent State of Samoa, the Democratic Republic of Sao Tome and Principe, the Republic of Serbia, the Republic of Sierra Leone, the Republic of Slovenia, the Republic of Trinidad and Tobago, the Republic of Tunisia), and the following countries requested the GSP secretariat to remain blank on the global product: Australia, the Republic of Austria, the Kingdom of Belgium, the Republic of Italy, the Republic of Latvia, New Zealand, and the Kingdom of Norway.
22. The first version (v1.0) of the GSOCseq is to be launched during the current 9th GSP Plenary Assembly.
23. The map will be regularly updated with new national submissions.
24. GSP Secretariat is preparing an accompanying scientific article about the GSOCseq and its process which will be published in a high impact factor journal with all contributors as authors.
25. Costa Rica and Mexico are currently implementing their national GSOCseq layers under the Recarbonization of Global Soils (RECSOIL) program to establish financial incentive schemes with the objective of scaling up sustainable soil management. Colombia has used its map to define their Nationally Determined Contributions (NDCs).

#### **9.1.4 Global Soil Salinity Map (GSSmap)**

26. The preparation of the Global Soil Salinity Map (GSSmap) was mandated by the 6th GSP Plenary Assembly to the GSP Secretariat.
27. The development process has involved a comprehensive capacity development programme which supported countries to produce their national GSSmap datasets. A set of technical documentation and a capacity building toolkit were prepared which consist of [GSSmap Technical Specifications and Country Guidelines](#), [GSSmap Technical Manual](#) and GSSmap Training Material.
28. The GSP Secretariat organised eight regional training activities (in person and online) which reached 390 national experts from 130 countries. These were followed by individual sessions to support national experts in finalizing national GSSmap datasets.

29. National GSSmap submissions consist of Electrical Conductivity (EC), Soil Reaction (pH), Exchangeable Sodium Percentage (ESP)/Sodium Absorption Rate (SAR) and salt affected soils maps together with uncertainty assessments for two depths (0-30cm and 30-100cm).
30. To date the following countries and territories contributed to the GSSmap with their national submissions: the Islamic Republic of Afghanistan, the Argentine Republic, the Republic of Armenia, the Republic of Azerbaijan, the People's Republic of Bangladesh, the Plurinational State of Bolivia, the Federative Republic of Brazil, Burkina Faso, the Kingdom of Cambodia, the Republic of Cameroon, the Republic of Colombia, the Republic of Djibouti, the Republic of Ecuador, the State of Eritrea, the Federal Democratic Republic of Ethiopia, Georgia, the Republic of Ghana, the Hellenic Republic, the Co-operative Republic of Guyana, Hungary, the Republic of India, the Republic of Iraq, the Republic of Italy, Jamaica, the Hashemite Kingdom of Jordan, the Republic of Kenya, the Lao People's Democratic Republic, the Lebanese Republic, the Kingdom of Lesotho, the Federated States of Micronesia, the Republic of Madagascar, the Republic of Mali, the Republic of the Marshall Islands, the United Mexican States, the Kingdom of Morocco, the Republic of Mozambique, the Republic of the Union of Myanmar, the Republic of Nicaragua, the Republic of Niger, the Federal Republic of Nigeria, the Sultanate of Oman, the Republic of Palau, the Independent State of Papua New Guinea, the Republic of Paraguay, the Republic of Peru, the Republic of the Philippines, the Republic of Moldova, the Republic of Senegal, the Federal Republic of Somalia, the Republic of South Africa, the Democratic Socialist Republic of Sri Lanka, the Republic of the Sudan, the Kingdom of Thailand, the Republic of Trinidad and Tobago, the Republic of Turkey, Ukraine, the United Republic of Tanzania, the United States of America, the United States Virgin Islands, the Bolivarian Republic of Venezuela, the Republic of Zambia, and the Republic of Zimbabwe.
31. The first version (v1.0) of the GSSmap will be launched during the Global Symposium on Salt-Affected Soils on 20 October 2021.
32. The map will be regularly updated with further national submissions.

### **9.1.5 Global Black Soils Map (GBSmap)**

33. In the second workshop of the International Network on Black Soils in 2019, member countries discussed and agreed to develop a Global Black Soil Distribution Map (GBSmap) as per the endorsed [definition of black soils](#).
34. A methodology, country guidelines and technical specifications were developed during the last quarter of 2020 and a GBSmap training course was held in December 2020 with 44 participants from 23 INBS countries.
35. Data collection phase started after this training session but to date only two INBS member countries were able to develop their national GBSmap layers due to lack of data on certain parameters and criteria of the endorsed definition of black soils. GSP secretariat is currently in contact with INBS member countries and experts and addressing the technical difficulties.

### **9.2 Global Soil Laboratory Network (GLOSOLAN)**

36. The number of registered members in GLOSOLAN doubled in 2020-2021, especially thanks to the virtual modality of meetings and trainings. This allowed more laboratories to easily access GLOSOLAN activities, but required a better downscaling process, empowering the regional and national soil laboratories network.

37. The Regional Soil Laboratory Network for the Near East and North Africa ([NENALAB](#)) was established in June 2020 through an online meeting. The regional networks for Africa ([AFRILAB](#)), Asia ([SEALNET](#)), Europe and Eurasia ([EUROSOLAN](#)), Latin America ([LATSOLAN](#)) and the Pacific ([ASPAC](#)) were established between 2017 and 2019 and organized their annual meetings to define their work plans and positions in the global network.
38. Two key-documents to support the establishment of [National Soil Laboratory Networks \(NASOLANs\)](#) were published: the [Terms of Reference of National Soil Laboratory Networks](#) and the [Guidelines on how to establish a NASOLAN](#). The status of soil laboratories in each country was reported in an online database, where the main needs and challenges are highlighted. As reported in the [Terms of Reference of laboratories in GLOSOLAN](#), GSP Focal Points were asked to nominate a soil laboratory to act as National Reference Laboratory. The latter is tasked to implement GLOSOLAN activities in the national context, promote the network initiatives and take the leadership in establishing the NASOLAN, with the support of the other soil laboratories operating in the country and the national government (via both technical and financial support).
39. Therefore, if not yet done, all GSP Focal Points are requested to nominate a National Reference Laboratory for their country and to support the establishment of national networks, together with the support of the local government. Countries and territories where a National Reference Laboratory has not yet been nominated are: Afghanistan, Côte d'Ivoire, Denmark, Italy, Kazakhstan, Kuwait, Mali, Papua New Guinea, Republic of Moldova, Serbia, Solomon Islands, Somalia, Spain, Switzerland, Uganda, United Arab Emirates, and United Kingdom of Great Britain and Northern Ireland. Moreover, countries with no laboratory registered in the network are: Andorra, Angola, Antigua and Barbuda, Bahamas, Barbados, Belize, Bosnia and Herzegovina, Brunei Darussalam, Burundi, Central African Republic, Comoros, Cook Islands, Cyprus, Democratic People's Republic of Korea, Dominica, Equatorial Guinea, Faroe Islands, Grenada, Guinea-Bissau, Guyana, Ireland, Kiribati, Libya, Lithuania, Luxembourg, Maldives, Malta, Marshall Islands, Mauritius, Micronesia, Monaco, Montenegro, Nauru, Niue, Norway, Palau, Qatar, Republic of Congo, Saint Kitts and Nevis, Saint Vincent and the Grenadines, San Marino, Seychelles, Singapore, Suriname, Sweden, Tajikistan, Timor-Leste, Tokelau, Turkmenistan, Tuvalu, Vanuatu. GSP Focal Points are kindly requested to encourage soil laboratories from the above-listed countries to register in GLOSOLAN.
40. The [Standard Operating Procedures \(SOPs\)](#) harmonized and published by GLOSOLAN in 2020 regard soil pH determination, soil electrical conductivity (soil/water, 1:5), saturated soil paste extract, soil available phosphorous (Bray I, Bray II, Mehlich I and Olsen methods), soil nitrogen (Kjeldahl method), soil total nitrogen (Dumas dry combustion method), soil organic carbon (Tyurin colorimetric method). Information on the sustainability of methods for each SOP were published on the GLOSOLAN website, in order to promote the transition towards more sustainable methods. 13 new SOPs (covering soil chemical, physical and biological parameters) are currently being harmonized.
41. Many GLOSOLAN publications (both constitutional documents and technical material) were translated and are available [online](#) in FAO languages.
42. GLOSOLAN issued training material (including videos) to support the implementation of several online training sessions which are scheduled to take place in 2021 in different time zones and languages. Experts from relevant fields who wish to contribute to GLOSOLAN training can write an email to [GSP-Secretariat@fao.org](mailto:GSP-Secretariat@fao.org).

43. A global soil laboratory assessment was conducted in 2020 through an online survey to collect information to improve the GLOSOLAN work plan in terms of activities, budget allocation and provision of country-specific political support. It can also help to mobilize financial resources and to develop better nationally and regionally oriented work plans on soil laboratories. The report (under final review) presents the status of soil laboratories around the world, with an overview of the state of the art of the services provided by these laboratories, the available resources, the challenges they face and how they could be addressed in order to enhance the generation of reliable soil data for sustainable soil management.
44. A technical committee has been established to enhance support and advises on the documents GLOSOLAN should work on and the activities to implement, and thus allocate human resources in a more effective way. The committee is made up by 20 members from all regions, including also a representative of the ITPS. This technical committee is currently working on updating Guidelines for Quality Management in Soil and Plant Laboratories (FAO Soils Bulletin – 74).
45. The network success strongly depends on the voluntary actions of its members. All the material produced and activities implemented are accessible by all GLOSOLAN members at no cost and aim to improve their analytical performance. However, this can be enhanced only if national governments support laboratories with financial support and adequate policies. Worldwide there is a need of raising the awareness of the role played by soil laboratories in producing reliable and comparable soil data, which are essential to develop plans of actions to promote sustainable soil management.
46. A comprehensive GLOSOLAN terminology is currently under development. An online tool will be soon put on the network website, where all the terms used in GLOSOLAN publications are listed, with clear definitions and external references.
47. New soil laboratory [equipment](#) was purchased and donated to those soil laboratories from developing countries (Botswana, Colombia, Costa Rica, Dominican Republic, Ecuador, Georgia, India, Iran, Jamaica, Kenya, Mexico, Republic of North Macedonia, Peru, Philippines, Thailand, Ukraine, Vietnam, and Zambia), which showed good results in the Proficiency Test (PT) organized by GLOSOLAN in 2019 (i.e. without external technical support). On the other hand, training was organized for those laboratories which showed lower performance in the 2019 PT.
48. A PT was not performed in 2020 due to the COVID-19 pandemic. Still, the organization of PTs at regional and national scales was promoted and supported. Moreover, an [online platform](#) was developed to allow the submission of PT results in an accessible and easy way.
49. Great efforts were made to collect and validate information on the customs control procedures for soil samples import for each country. A [Soil Import Legislation \(SIMPLE\)](#) online database was put in place in June 2020. GLOSOLAN is doing its best to keep the database updated. Countries are requested to contribute to the development and update of the SIMPLE database by sending an email to [GSP-Secretariat@fao.org](mailto:GSP-Secretariat@fao.org).
50. The [27th Session of the Committee on Agriculture \(COAG\)](#), endorsed a [resolution](#) proposed by GLOSOLAN and GSP on the international exchange of soil samples for research purposes. All GSP and GLOSOLAN members are requested to promote its adoption at national level by governments.
51. As endorsed by the 8th PA, the [International Network on Fertilizers Quality Assessment \(INFA\)](#) was established in December 2020, under the framework of GLOSOLAN (please see detailed

information about INFA in the following sub-section 9.3). The network currently counts more than 100 members, from around 60 countries involving three categories of laboratories: (i) those that have the official mandate of their government to do fertilizer analysis; (ii) those that do fertilizer analysis on a voluntary basis; and (iii) laboratories which do not perform fertilizer analysis yet, but are interested in the topic.

52. The first plenary meeting of the [GLOSOLAN initiative on soil spectroscopy](#) was held virtually in September 2020. This initiative will mainly focus on capacity development at national level. This includes training on national/regional soil spectral laboratories building, developing national/regional soil spectral libraries with its estimation service, and provision of advisory services on suitable instrumentation. The objective is to allow countries access to more soil data using a time- and cost-effective analytical method. Ultimately, national/regional soil maps can be improved and used to facilitate sustainable soil management.
53. GLOSOLAN is actively working with its partners in developing an open data architecture for a Global Soil Spectral Calibration Library and a global soil property estimation service. Nine regional champion laboratories were established to serve as hubs for training and capacity building and to develop national/regional libraries and estimation services. It was agreed that the United States Department of Agriculture's Kellogg Soil Survey Laboratory (KSSL) would serve as the primary Mid-Infrared spectral library for the initial launch of the GLOSOLAN Mid-Infrared Spectral Library.
54. A global survey on the capacities and needs of soil laboratories around the world regarding the measurement of soil spectral properties was conducted in 2020, in collaboration with ISCRIC (International Soil Reference and Information Centre – World Soil Information), in the framework of the GLOSOLAN initiative on soil spectroscopy. The survey report is under final review and includes the information collected in the survey on the capabilities and needs of soil laboratories for collecting and managing soil spectral data. The text provides an overview of the current expertise, capabilities, needs and priority areas for labs that want to start or improve their spectral measurements and modelling, both for mid-infrared (MIR) and visible and near-infrared (VNIR) regions.

### **9.3 International Network of Fertilizers Assessment (INFA)**

55. As endorsed by the 8<sup>th</sup> GSP Plenary Assembly, the [International Network on Fertilizers Quality Assessment \(INFA\)](#) was established in December 2020, under the framework of GLOSOLAN. The network currently counts more than 100 members, from around 60 countries and is made up by three categories of laboratories: (i) those that have the official mandate of their government to do fertilizer analysis; (ii) those that do fertilizer analysis on a voluntary basis; and (iii) laboratories which do not perform fertilizer analysis yet, but are interested in the topic.
56. The number of registered members in INFA increased almost 60 % (from January to June 2021) mainly due to the contribution of GSP Secretariat regional facilitators, and focal points for effectively disseminating the work of INFA until the Second Meeting of the network.
57. The INFA website now includes the [interactive map](#) showing the three different categories of laboratories that make up the network and other general information.
58. [The Second Meeting of INFA](#) was held as planned on 29-30 June, 2021 with the following outcomes:

- The objectives and indicators of performance of the network were endorsed.
- [Governance](#). An essential step towards consolidation of the network was taken by electing Dr. Wesley Karl Feldmann (Malawi) as the Chair, and Dr. Gerardo Ojeda (Colombia) as the Vice-Chair of INFA.
- [Presentations from experts](#). The following experts on different topics of relevance to INFA, shared their experiences with the participants: Mr. Vossie Wilsnach, Convenor of the International Fertilizer Association (IFA) Method Harmonizing Working Group and Omnia Group, Ms. Aleksandra Bereza-Stachowiak, Baltic Control A/S. and Ms. Nopmanee Suvannang, GLOSOLAN Chair.
- Working groups. Priority topics to be addressed by working groups were defined, including: harmonization of protocols and methodologies for fertilizer analysis (proficiency tests to assess measurements efficiency); SOP's for mineral fertilizers (macronutrients and trace elements), organic, foliar and liquid, biofertilizers and nano fertilizers; harmonization and development of standards; policies and implementation; development of regional and national networks; building capacities through courses for laboratory technicians, actors in the field, and supported with equipment of standardized labs; regulation and legislation and raising awareness; and dissemination and communication.
- In terms of SOP harmonization, participants agreed to give priority to the harmonization of analysis methods for (in order of priority):
  - Mineral fertilizers (Priority 1)
  - Organic fertilizers and amendments/improvers like manure, slurry, substrate, sapropel and compost (Priority 2). SOPs should consider the microbial/microbiological component of this fertilizer type.
  - Liquid fertilizers
  - Foliar fertilizers
  - Bio-fertilizers
  - Nano-fertilizers

59. An [INFA brochure](#) was issued with key information on the network including the background, importance and goals being sought and how to join it.

60. Commitments and future activities:

- The formation of the working groups according to the topics endorsed in the Second Meeting of INFA, will be carried out via email and an annual network work plan (June 2021- June 2022) will be developed.
- Issuance of the report of the Second Meeting of INFA.
- Report on the results of the Survey on Fertilizer Quality Assessment.
- Reporting to the GSP Plenary Assembly.
- Reporting to the Annual GLOSOLAN Meeting to be held 23-- 25 Nov 2021.
- Organization of the Third INFA Meeting.

#### **9.4 International Network of Black Soils (INBS)**

61. The International Network of Black Soils (INBS) was established in 2017 under the aegis of the Global Symposium on Soil Organic Carbon.
62. Since 2020, the INBS is focused on the preparation of the Global Status of Black Soils report and the Global Black Soils map (GBSmap). Both activities follow a country-driven and inclusive framework engaging INBS members, national experts, ITPS and GSP Secretariat.
63. An open call for contributors to the Black Soil Report was launched in March 2019 and 81 experts from 21 black soil countries responded to it. A Table of contents and templates for chapters have been endorsed and authors appointed. A continuous iterative process for drafting was facilitated by the secretariat and ITPS members.
64. An online discussion session for the Black Soil Report was organized in October 2020 to inform and discuss the structure and template of the report with contributors from black soil member countries. A zero draft of the Black Soil Report was prepared.
65. A methodology of the GBSmap has been jointly developed as a country-driven product following the decision of the 2nd Workshop of the INBS. The mapping process is proceeding, but some adjustments to the methodology are in place given data constraints at country level. An online discussion session was organized in October 2020 to discuss the methodology of the GBSmap. An online training session for the GBSmap was also organized in November 2020 for training national experts on black soils mapping.
66. On 21-23 July 2021, China organized the International Forum on Black Soil Conservation and Utilization. The INBS contributed to this forum by connecting with INBS members who made presentations during the event. The GSP Secretariat has also launched a black soils video to summarize the importance of these key soils.

#### **9.5 International Network of Salt Affected Soils (INSAS)**

67. The International Network of Salt-Affected Soils (INSAS) was established in 2019 during the International Center for Biosaline Agriculture's first Global Forum on Innovations for Marginal Environments. The Network aims to facilitate the sustainable and productive use of salt-affected soils for current and future generations. The network is currently made up by around 600 members from 120 countries.
68. In April 2021, the first meeting of the INSAS network (<http://www.fao.org/3/cb4954en/cb4954en.pdf>) took place in a virtual format with the aim to: (i) review tools and activities related to salt-affected soils; (ii) discuss the technical presentations prepared by the partners of INSAS covering the main areas of work related to salt-affected soils; and (iii) agree on the INSAS work plan and governance.
69. The development of the documents and other outcomes of INSAS is entrusted to four working groups comprised of experts in the relevant areas of work: (i) Assessment: Mapping, assessing and monitoring of salt-affected soils; (ii) Sustainable management of salt-affected soils (practices, policy); (iii) SAS and crops: Halophyte agriculture and salt-tolerant crops; (iv) SAS and Water: Integrated soil and water management under saline/sodic conditions.

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70. Between May and June 2021, working sessions of the different groups were virtually organized to identify the priority tasks and plan the way forward. The Assessment working group will address review and refinement of methodology for mapping salt-affected soils; the SSM working group will work on the database on SSM practices in the context of SAS; the Crops working group will cover existing models connecting crop/plant production and soil salinity/sodicity; the Water working group will develop a manual on sustainable water management in saline/sodic environments. In September – December 2021, the next round of working sessions will be held in a virtual format to pursue work over these tasks.