



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



# Report on the Sixteenth Working Session of the Intergovernmental Technical Panel on Soils (ITPS)

Virtual Session March 2022

**REPORT ON THE SIXTEENTH WORKING SESSION OF THE INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS**

**Virtual Session March 2022**

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

**Rome, 2022**

**Content**

- 1. Opening of the meeting.....4
- 2. Report on the ITPS to the GSP PA (*for information and decision*).....4
- 3. Development of the new GSP Action Framework 2022-2030 (*for information and decision*) .....4
- 4. Report on the work performed since the fifteenth working session (*for information and decision*) .....5
  - a. Report on the SOC working group.....5
  - b. Report of the soil pollution working group .....5
  - c. Report on the soil biodiversity working group .....6
  - d. Report of the soil salinity working group .....6
  - e. Report on the soil fertility working group .....6
  - f. Report on the black soils working group .....7
  - g. Report of the soil information and data working group .....7
- 5. Future of ITPS Letters (*for information and decision*).....8
- 6. Participation of the ITPS in the World Congress of Soil Science 2022 (*for decision*) .....8
- 7. Protocol for Sustainable Soil Management (*for information*) .....9
- 8. Global Soil Doctors Programme (*for information and decision*) ..... 10
- 9. Discussion on the second edition of the SWSR Report (*for information and decision*) ..... 10
- 10. Any other business ..... 11
- 11. Closure of the meeting ..... 11
- Annex I - List of Participants ..... 12
- Annex II – Abstracts submitted to the WCSS22 ..... 14
- Annex III. Table of Contents for 2025 Status of the World’s Soil Resources Report (SWSR) ..... 16

## 1. Opening of the meeting

The sixteenth working session of the Intergovernmental Technical Panel on Soils (ITPS) took place over three days, from 28 to 30 March 2022, from 12:00 to 14:00 Central European Summer Time (CEST), in a virtual format through the Zoom video communications platform.

**Dr Rosa M. Poch**, ITPS chair, opened the meeting and greeted all the participants. She thanked the ITPS members and the GSP Secretariat for carrying on the excellent work and gave special recognition to the ITPS members whose term ends this year.

**Mr Ronald Vargas**, Global Soil Partnership (GSP) Secretary, greeted participants and thanked all ITPS members for their efforts and good work over the past three years. He went onto briefly comment on the procedure and result of the ITPS appointment. He pointed out that only seven members reapplied and that not all regions had yet sent the final list of candidates for consideration by the GSP Plenary Assembly (PA).

**Mr Vargas** thanked the ITPS members for the efficient work carried out since the fifteenth working session, especially on the ITPS soil letters, reiterating that the letters were an excellent tool for raising awareness on complex issues in a simple and straightforward manner and noted that they were appreciated by the GSP community. He gave the example of the use of the ITPS Letter on Soil Health, the definition of which has been used by the Convention on Biological Diversity (CBD) to adopt the concept of soil health as part of the Post-2020 discussions.

The agenda and timetable were both adopted by popular vote and a volunteer for the role of Rapporteur was requested. **Dr Costanza Calzolari** put herself forward for the role.

## 2. Report on the ITPS to the GSP PA (*for information and decision*)

**Dr Rosa Poch** presented the main activities to be reported to the tenth GSP PA in the ITPS document, including the ITPS Letter, and the abstracts submitted and accepted by the 22<sup>nd</sup> World Congress of Soil Science (WCSS22). She also summarised the work programme for 2022-2023.

**Dr Lucia Anjos** asked about the participation of the ITPS on the WCSS22 and **Dr Poch** clarified that as soon as members confirmed their participation, presentations would be distributed accordingly.

**Dr Ellen Graber** asked about the continuity of the involvement of current members in the ongoing activities that will be carried out after the end of their mandate. It was clarified that there will be a transition process with the new Panel to be appointed by the 10<sup>th</sup> GSP Plenary Assembly in May and that current ITPS members are expected to continue to support ongoing activities such as the organization of the Symposium or the preparation of global reports.

## 3. Development of the new GSP Action Framework 2022-2030 (*for information and decision*)

**Ms Natalia Rodríguez Eugenio** from the GSP Secretariat briefly presented the main proposal developed by the Open-ended working group (OEWG), focusing on the new vision and mission for the GSP for 2022-2030. The changes in the structuring of activities from pillars to action areas were also described.

**Dr Graber** asked if and how any efforts are being made to monetize the adoption of sustainable soil management (SSM) practices by farmers. The GSP Secretariat explained that this was already being handled by the RECSOIL initiative, which provides incentives to farmers who adopt SSM practices and improve soil health.

**Dr Peter de Ruiter** expressed his satisfaction with the process and suggested aligning the indicators to be developed to quantify the targets set with those to be used in the second edition of the State of the World's Soil Resources Report (SWSR report).

**Dr Anjos** suggested that the conversation about soil threats be replaced by a debate on the risks faced by soils as proposed in the second edition of the SWSR report. She also asked what would happen to the old pillars on harmonization (pillar 5) and education (part of pillar 2), which did not appear to be reflected in the proposed new structure and suggested associating the new actions with the old pillars to avoid confusion and ensure continuity.

**Dr Megan Balks** also stressed the importance of coordinating actions and targets with the SWSR report.

#### **4. Report on the work performed since the fifteenth working session (for information and decision)**

##### **a. Report on the SOC working group**

**Ms Rosa Cuevas** from the GSP Secretariat presented the progress on the summary table that the GPS Secretariat has been preparing, based on information gathered in the Technical Manual on Best Management Practices for Soil Recarbonization (SOC Technical Manual). The table will help create a digital database so that additional data on SSM practices can be uploaded and will also serve as an interactive tool to navigate the SOC Technical Manual. She also explained that another use could be to generate practice-based SSM scenarios and to validate the GSOCseq model.

**Dr Anjos** raised the point on cases that were accepted to the SOC Manual noting that if they did not have sufficient data they may be excluded from the database. **Dr Balks** asked if this table would be used to develop a summary of the SOC Technical Manual. **Dr Gary Pierzynski** suggested that unit conversion factors be added to the table. **Dr Poch** noted that some of the outliers were for newly created soils (e.g. rehabilitation after mining, roof crops, etc.) and should be excluded from the table. **Ms Cuevas** took note of these recommendations and assured members that they would be considered during the finalization of the table.

**Ms Carolina Cardoso** from the GSP Secretariat presented the latest developments of the "RECSOIL: Recarbonization of global agricultural soils initiative". She described the different stakeholders to be included in the process and some key aspects to be considered when implementing the project. Ms Cardoso presented the first pilot sites where the RECSOIL Green Pathway would be implemented: Costa Rica, Ecuador, Kenya, and Mexico.

**Dr Lydia Chabala** raised the question of whether there is a mechanism to guarantee the continuity of the project after its completion. **Ms Cardoso** explained that the government is involved from the beginning so that RECSOIL is included on the national plans to guarantee continuity over the long term.

##### **b. Report of the soil pollution working group**

**Mr Sergejus Ustinov** from the GSP Secretariat presented the International Network on Soil Pollution (INSOP) that would be launched on 22 April and described the status of the different chapters of the Technical manual for soil pollution assessment, mapping, monitoring and reporting, as well as the pilot projects that the GSP would set up in the different regions to manage and remediate agricultural soils contaminated with trace elements. He explained that the first pilot projects would focus on cocoa production affected by cadmium in several countries in Latin American and the Caribbean.

Both **Dr Graber** and **Dr Anjos** showed interest in INSOP and the pilot projects and suggested having a follow-up discussion to participate in and support such activities.

### ***c. Report on the soil biodiversity working group***

**Ms Rosa Cuevas** from the GSP Secretariat presented the main activities of the [International Network on Soil Biodiversity](#) (NETSOB) for 2021-2022. She explained the main outputs which were the [launch of NETSOB](#) in December 2021, the organization of the meetings of the four working groups in February 2022 and the organization of the first meeting of the joint working group on soil biological analysis GLOSOLAN/NETSOB in March 2022. She also summarized the discussions that took place at the 24<sup>th</sup> Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-24) of the CBD and the revision of the Action Plan of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity. She highlighted that SBSTTA members recognized the role of NETSOB and the Global Soil Biodiversity Observatory (GLOSOLAN) in the implementation of this International Initiative, and that a paragraph to this effect will be reflected in the COP 15 documents.

**Dr Peter de Ruiter**, chair of NETSOB, made a number of final remarks, suggesting having a strong connection between NETSOB and future ITPS members. No other questions were raised.

### ***d. Report of the soil salinity working group***

**Ms Maria Konyushkova**, the coordinator of the International Network of Salt-affected Soils (INSAS) at the GSP Secretariat, started by thanking the ITPS soil salinity working group. She reported that the outcome document and proceedings book of the Global Symposium on Salt-affected Soils (GSAS21) were prepared over this period. She also summarized the status of the global report on the status of salt-affected soils and INSAS progress. She outlined the discussions held in the different meetings of the specific INSAS working groups – SAS&Assessment, SAS&SSM, SAS&Crops and SAS&Water, in addition to discussing the workplans for 2022-2023.

**Dr Anjos** commented on future INSAS products and suggested considering the inclusion of remote sensing tools, as the science behind them had improved impressively. **Dr Graber** offered her support in sourcing experts from Israel to contribute to the global status report. **Dr Jamal Khan** requested instructions on how to submit the map of salt-affected soils of Pakistan where SAS occupy large areas of up to seven million hectares. **Mr Christian Omuto** who is coordinating the mapping activity on behalf of the GSP secretariat responded that he would provide instructions accordingly. **Dr Generose Nziguheba** asked about the details on the governance chapter of the GSAS report. **Ms Konyushkova** explained that the existing governance were reflected in the SoILEX as well as the pending issues to address.

**Dr Kutaiba Hassan** wondered how many international networks existed and whether they were needed. He pointed out that the objectives of these networks had yet to be achieved. He also advised that INSAS consider addressing SAS recovery. **Ms Konyushkova** explained that most of the GSP networks were relatively new, but that the progress achieved in such a short time and the success of another network with a longer history such as the Global Soil Laboratory Network (GLOSOLAN) showed that these networks are necessary and allow a large number of international and multidisciplinary experts to jointly advance on a topic of common interest.

### ***e. Report on the soil fertility working group***

**Ms Vinisa Saynes** from the GSP Secretariat presented the soil fertility working group report, on behalf of **Dr Gary Pierzynski** and **Dr Rafla Attia**, co-leads of the ITPS fertility working group. She presented the Global Symposium on Soils for Nutrition (GSOIL4N symposium). The GSOIL4N symposium will be held in July 2022 and the scope, objectives, proposed themes, and key issues to be addressed were presented. The concept note would be circulated in the near future for input from ITPS members. **Dr Anjos** proposed candidates for key speakers in the GSOIL4N considering gender balance. She then gave a brief outline of the activities for the implementation of the

International Code of Conduct for the Sustainable Use and Management of Fertilizers (Fertilizer Code), and the latest activities of the International Network on Fertilizer Analysis (INFA). **Ms Saynes** emphasised the importance of the collaboration of the fertility group activities and INFA with GLOSOLAN.

**Mr Yuxin Tong** from the GSP Secretariat presented the main results of the capacity building exercise on SSM for Africa in relation to the project work in Rwanda and Uganda and **Ms Carolina Olivera** from the GSP Secretariat presented the preliminary results of the project for sustainable soil management for nutrition sensitive agriculture being implemented in Bangladesh, Burkina Faso and Malawi.

**Dr Anjos** noted that nutrient governance is a key issue that urgently needs to be addressed on a global level and asked if ITPS members could continue to contribute to the work of the working group even if their mandate ends. Support and collaboration with current ITPS members beyond their mandate was reiterated. **Ms Saynes** offered to collect all comments and maintain close communication with ITPS members in the following weeks to promote active participation in the organization of the GSOIL4N symposium. **Dr David Lobb** asked about the connections between soil erosion and nutrient loss, especially when developing maps. This topic would be addressed in the item on mapping. **Dr Fernando Garcia Prechac** stated the importance of including the global nutrient reserves topic in the nutrient budget activities.

***f. Report on the black soils working group***

**Dr Lucia Anjos**, coordinator of the ITPS black soils working group, presented the progress on the preparation of the global status report on black soils and the Global Black Soils Distribution Map (GBSmap), as well as the main decisions of the International Network on Black Soils (INBS) workshop held in December 2021. She informed the ITPS that most of the black soils member countries had already submitted their contributions to the report. The draft is being revised and ahead of the launch at the 10<sup>th</sup> GSP PA in May 2022.

**Dr Jun Murase** advised the food expert from black soil countries to highlight its fundamental role in global food security. He also provided an approach in this regard in terms of estimation of the potential productivity of the whole black soil agricultural lands based on the area and the average yields in black soils.

***g. Report of the soil information and data working group***

**Mr Yusuf Yigini** from the GSP Secretariat, on behalf of ITPS mapping group, presented a status update on the Global Soil Information System (GloSIS) global data products and GloSIS spatial data infrastructure and governance. The full report can be found here: <https://docs.google.com/document/d/1db-vuE0ZSdYS42xN-qYdiQjx3sR8Y1I1kUiFVY7DFUs/edit>. He summarised the status of the Global Soil Organic Carbon Map (GSOCmap), Global Soil Organic Carbon Sequestration Potential map (GSOCseq), Global Salt-Affected Soils map (GSASmap), and the Global Black Soil Distribution Map (GBSmap). Mr Yigini also introduced the upcoming country-driven products to be developed throughout 2022 and 2023: the Global Soil Nutrient Budget map (GSNmap) and the Global Soil Erosion map (GSERmap). He informed ITPS members that an updated version of the GSOCmap (v1.6) was launched at the end of 2021 including a technical report. He also described the planned updates on the GSOCmap to version 2.0, specially focused on uncertainty assessment and harmonisation. **Mr Yigini** explained that work on the GSERmap commenced at the beginning of 2022, and the ITPS and the International Network on Soil Information Institutions (INSII) would be consulted regularly over the technical elements of the GSERmap development process.

In the following discussion, **Dr David Lobb** commented that the GSOCmap 2.0 should include the temporal harmonisation of the SOC measurements. **Mr Yigini** agreed that temporal harmonisation is a central point.

However, the current temporal harmonisation approaches require high data availability that cannot be ensured for all countries. Hence, it will remain an aspect that should be envisioned in future updates of the GSOCmap. Furthermore, **Dr Lobb** asked why inorganic carbon mapping was not featured on the GSOCmap 2.0 update, as it would close an existing knowledge gap. **Mr Yigini** explained that a survey sent out to countries demonstrated that limited data availability from countries posed a major obstacle to mapping inorganic carbon. **Dr Lobb** also requested further clarification regarding the generation of a baseline map for the GSOCseq.

#### 5. Future of ITPS Letters (for information and decision)

**Dr Rosa Poch** explained that five letters had been published so far:

1. Towards a definition of soil health, in September 2020;
2. Soil Organic Carbon and Nitrogen, in March 2021;
3. Salt-affected soils are a global issue, in May 2021;
4. Spectroscopy: towards eco and human friendly soil analysis, in September 2021, and
5. Urbanisation and soil sealing, in March 2022.

She mentioned that some letters were still in draft form; those on soil governance, biochar, potentials and constraints, and soils for nutrition, and acknowledged that although some efforts would be made to finalize them, their publication would likely fall under the responsibility of ITPS members. She concluded by thanking all the members who had contributed to the preparation of these letters and reiterated their importance.

The GSP Secretariat proposed the creation of a publication compiling all the letters to disseminate them more widely, as well as to continue promoting them on social media, where they have been very successful to date.

#### 6. Participation of the ITPS in the World Congress of Soil Science 2022 (for decision)

**Dr Poch** also updated the group on the acceptance of the seven abstracts submitted by the ITPS and the format in which they would be presented at the World Congress on Soil Science (WCSS), organised by the International Union of Soil Sciences (IUSS), to be held in Glasgow, Scotland in August 2022. All members thanked **Dr Poch** for accepting their submissions on behalf of the ITPS. The abstracts submitted and accepted are summarized in the table below (more details are available in [Annex II](#)):

Title	Type	Session	ITPS members
1. Strengthen global and national capacities on soil information, soil mapping to support Sustainable Soil Management (SSM) decision-making and planning	Oral	Session 1: Spatial decision-making and mapping for implementing policies for sustainable soil management.	Rafla Attia
2. Connecting soils with people: Global Soil Partnership initiatives	Oral	Theme 7: Soil securing humanity   Humanity securing soil	Lydia Chabala, Costanza Calzolari
3. Protect black soils to achieve food and environmental security: Report on the Global Status of Black Soils	Oral	Session 8. Sustainable land use	Lucia Anjos



4. Development and Implementation of the International Code of Conduct for the Sustainable Use and Management of Fertilizers	Poster	Session 8. Sustainable land use	Gary Pierzynski
5. The Global Maps of the Global Soil Partnership: from bottom to top.	Poster	Theme 32: Soil information standards and systems, current initiatives and status update	Lydia Chabala
6. FAO International Network of Salt-Affected Soils: enhancing efforts to manage salt-affected soils (SAS) sustainably	Poster	Session 10 Land contamination and degradation, including urban land	Maria Konyushkova, Mohammad Khan
7. Recarbonizing global soils: a Technical Manual of recommended management practices	Poster	Session 2: Soil carbon: From particle to planet	Fernando García Prechac, Rosa Poch

**Dr Poch** called on ITPS members to confirm whether or not they would be attending the WCSS so that the various presentations could be distributed among all members. She also requested support from the authors of the different abstracts for the preparation of the presentations and posters, and the assistance of the GSP Secretariat.

#### 7. Protocol for Sustainable Soil Management (*for information*)

**Ms Carolina Olivera** from the GSP, presented the status of the user Manual and annexes of the Protocol for the assessment of sustainable soil management (SSM). The SSM Protocol includes the description of the study area, the procedures for the measurement of indicators and the instructions for the soil health or SSM assessment, to determine the compliance of implemented management practices with the Voluntary Guidelines for Sustainable Soil Management (VGSSM).

Some new aspects of the Manual are the sampling methods, which provide different options adapted to the objectives and available means of carrying out studies. In addition, the protocol proposes two options for the assessment, a soil health evaluation, based on the measurement of the 4 indicators and a visual soil assessment, and an SSM assessment including baseline data and indicators measurement based on at least four years of SSM implementation. A screening survey is included in the annexes, to evaluate the need of additional indicators. Likewise, the annexes include the description of the methodologies for the measurement of the SSM indicators, as well as the instructions for the use of remote sensing tools. A timeline for revision and publication of the Manual is proposed.

**Dr Lucia Anjos** requested clarification on the current approach of the Manual, which remains based on qualitative assessments of low/high or the increase/decrease with respect to a reference and expressed her concerns about the use of references to general or not suited to the local geography and soil differences. **Dr Anjos** referred specifically to the productivity indicator — which was also mentioned by **Dr Lydia M. Chabala** in her question posted on the zoom chat box. **Ms Carolina Olivera** confirmed that the qualitative comparative approach of earlier versions of the Manual is maintained and stressed that the recommendation is to use as local references where possible.

**Dr Lucia Anjos** also asked about the maintenance of the information obtained from the survey, wishing to know how data access and rights of cancellation and rectification would be managed. **Ms Carolina Olivera** explained that the publication of information obtained from farmers would be subject to gaining their authorization.

**Dr David Lobb** said that the survey data from the interpretation of the protocol had a huge value and held the potential to be useful for the validation of the SWSR models and forecasts. He asked whether a follow up survey was planned and what the timeline for that would be. **Ms Carolina Olivera** confirmed that the survey is going to be repeated and implemented in other regions. She pointed out that countries are usually very grateful to receiving feedback from this kind of exercise and that she anticipated receiving an affirmative response from them.

**Dr Rafia Sahli E. Attia** offered to contribute to the revision of the current version of the Manual and asked about the possible utilization of the data on soils and SSM obtained from it within soil and land degradation assessments and to produce recommendations for best practices. **Ms Carolina Olivera** pointed out that, although the primary objectives of the Protocol and the Manual were not to assess land degradation trends but to assess soil health and SSM practices, and that the data obtained would be valuable in the evaluation of soil and land degradation.

**Dr Mohammad Jamal Khan** warned about the different sampling requirements in relation to objectives that the Manual may be used for, with a specific citation of the assessment on soil fertility. He asked about the sampling instructions and recommendations. **Ms Carolina Olivera** stressed that the Manual offered three different sampling strategies, to be selected depending on the aims of the assessment and asked for the input of **Dr Mohammad Jamal Khan** on the matter, which he agreed to.

#### **8. Global Soil Doctors Programme (*for information and decision*)**

**Ms Silvia Pioli** from the GSP presented a general overview of the Soil Doctors Programme, a farmer-to-farmer training initiative which aims to raise awareness and build the capacities of farmers on SSM practices. Emphasis was placed on the importance of the collaboration between the GSP and the promoting institution of each country to guarantee the sustainability of the programme over the long term. The adaptation of the programme to the local context strongly depends on the feedbacks and inputs provided by the promoter who is responsible for the selection and training of the soil doctors using communication materials such as posters, field exercise, soil educational kits produced and supplied by the GSP. ITPS members were invited to contribute with their technical expertise to the development of the programme by revising and improving the posters and field exercises. Moreover, all members were asked to involve interested institutions and to engage them to join the programme.

**Dr Siosua Halavatau** from Tonga commented that they were interested in implementing the programme in the Pacific countries in coordination with other ongoing projects. He reported that soil testing tools for the chemical characterization of soils had already been implemented in his country.

**Dr Ashok K. Patra** pointed out the need to develop specific training to assess soil nutrient availability and give practical recommendations on how to best manage nutrients in soil. These topics represent key elements for the capacity building of communities in rural India.

#### **9. Discussion on the second edition of the SWSR Report (*for information and decision*)**

**Dr Dan Pennock**, the managing editor of the second edition of the SWSR report, presented the progress to the current Editorial Board (EB), consisting of the ITPS Chair, Ms Rosa Poch, and one ITPS member from each region:

**Dr Megan Balks** (Pacific and EB leader), **Dr David Lobb** (North America and EB leader), **Dr Lydia Mumbi Chabala** (Africa), **Dr Ashok Patra** (Asia), **Dr Costanza Calzolari** (Europe), **Dr Lucia Anjos** (Latin America), and **Dr Rafia Attia** (Near East and North Africa). The members of the Executive Editorial Board (Ms Balks, Ms Poch, Mr Lobb and Mr Pennock) have held weekly meetings since April 2021.

**Dr Pennock** explained the proposed changes for the second edition to the panel, which include to move from soil threats to risks to soil and the renaming of some of the soil threats/risks. The table of content was presented and adopted (see [Annex III](#)).

**Dr Pennock** also discussed the regionalization of the report and encouraged members to contribute to the regional assessments. Members of the EB gave presentations on the SWSR 2025 with reference to the Regional Soil Partnership meetings starting from March 2022 to inform them about the report and the role of the Partnerships in the panels of regional experts.

In response to the presentation, comments were put forward and discussed. The GSP Secretariat raised serious concerns about the proposed changes and pointed out that all communication materials and activities for the past seven years have been conducted based on the ten soil threats and that a name change may not be strategic and asked the EB to reconsider this point.

Some members raised concerns about the proposed structure changes, as it would make it difficult to use the previous edition as a baseline. The reports would then not be comparable and would not be able to be considered in a trend analysis.

#### **10. Any other business**

N/A.

#### **11. Closure of the meeting**

**Ms Rosa Poch** closed the meeting by thanking all ITPS members and GSP Secretariat staff for participating and for their active contributions to the discussions.

## Annex I - List of Participants

<b>ITPS members</b>	<b>Region</b>
Dr Lydia Mumbi Chabala (Zambia)	Africa
Dr Générose Nziguheba (Burundi)	Africa
Dr Rafla Sahli Epse Attia (Tunisia)	Near East and North Africa
Dr Kutaiba M. Hassan (Iraq)	Near East and North Africa
Dr Saéb Khresat (Jordan)	Near East and North Africa
Dr Martha M. Bolaños-Benavides (Colombia)	Latin America and Caribbean
Dr Fernando Garcia Prechac (Uruguay)	Latin America and Caribbean
Dr Lucia Anjos (Brazil)	Latin America and Caribbean
Dr Samuel Francke Campana (Chile)	Latin America and Caribbean
Dr David Allen Lobb (Canada)	North America
Dr Gary Pierzynski (USA)	North America
Dr Ashok K. Patra (India)	Asia
Dr Jun Murase (Japan)	Asia
Dr Jin Ke (China)	Asia
Dr Mohammad Jamal Khan (Pakistan)	Asia
Dr Costanza Calzolari (Italy)	Europe
Dr Ellen R. Graber (Israel)	Europe
Dr Peter de Ruiter (The Netherlands)	Europe
Dr Alexey Sorokin (Russian Federation)	Europe
Dr Rosa Poch (Spain)	Europe
Dr Siosua Halavatau (Tonga)	Pacific
Dr Megan Balks (New Zealand)	Pacific

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<b>Other participants</b>	<b>Affiliation</b>
Mr Ronald Vargas	GSP Secretariat
Mr Filippo Benedetti	GSP Secretariat
Ms Lucrezia Caon	GSP Secretariat
Mr Sergejus Ustinov	GSP Secretariat
Ms Maria Konyushkova	GSP Secretariat
Ms Rosa Cuevas Corona	GSP Secretariat
Ms Natalia Rodríguez Eugenio	GSP Secretariat
Ms Carolina Olivera Sánchez	GSP Secretariat
Ms Carolina Cardoso Lisboa	GSP Secretariat
Ms Vinisa Saynes Santillan	GSP Secretariat
Ms Silvia Pioli	GSP Secretariat
Mr Yuxin Tong	GSP Secretariat
Ms Cruz Ferro	GSP Secretariat
Ms Isabel Luotto	GSP Secretariat
Mr Yusuf Yigini	GSP Secretariat
Mr Yi Peng	GSP Secretariat
Mr Christian Omuto	GSP Secretariat
Ms Isabelle Verbeke	GSP Secretariat
Ms Julia Mousquer	GSP Secretariat
Mr Dan Pennock	GSP Secretariat
Ms Giulia Stanco	GSP Secretariat
Mr Matteo Sala	GSP Secretariat

## Annex II – Abstracts submitted to the WCSS22

Title	Abstract
<p>1. Strengthen global and national capacities on soil information, soil mapping to support Sustainable Soil Management (SSM) decision planning</p>	<p>Since 2013, the Global Soil Partnership (GSP) and the Intergovernmental Technical Panel on Soils (ITPS) have promoted Sustainable Soil Management (SSM) and soil governance to guarantee healthy and productive soils, in relation to UN Sustainable Development Goals (SDGs) and Organisation for Economic Co-operation and Development (OECD) initiatives. The GSP has assisted countries to implement the Voluntary Guidelines for Sustainable Soil Management (VGSSM), published in 2016, through technical aspects, the publication of SSM assessment protocols and building capacity development for soil monitoring and natural resource management. In order to do so, there is an urgent need for georeferenced soil information linked to decision support systems.</p> <p>The Global Soil Information System (GloSIS) is a tool used to monitor global soil resources. In particular, the GSP and its partners designed SoilSTAT to monitor, forecast and periodically report on the status of global soil resources. The Digital Soil Profile Databases SPDB, with a tiered approach, is a result of a collaboration between FAO, the International Institute for Applied Systems Analysis (IIASA), the ISRIC-World Soil Information, the Institute of Soil Science, the Chinese Academy of Sciences (ISSCAS), and the Joint Research Centre of the European Commission (JRC). New regional soil data and information will be available to update the last Harmonized World Soil Database (HWSD, 2017).</p> <p>Improving the availability and suitability of datasets for countries to report on SDG 15.3.1 and land degradation neutrality (LDN) is a major focus to enhance, or to complement national data sources, which are the input data for land management decision support systems.</p>
<p>2. Connecting soils with people: Global Soil Partnership initiatives</p>	<p>As soil scientists we are aware that we can no longer work in silos disconnected from people: our work is directly related to highlight the role played by soil in the provision of ecosystem services, and thus, the soil science community should rise to the challenge of providing reliable and readily accessible information to communities to remain relevant. Soil awareness is one of the pillars of FAO's GSP, which has been working on connecting soils to people. The annual World Soil Day (WSD) held on 5 December was launched in 2014. It has gained traction since then, and in 2020 alone, an estimated 800 million people worldwide participated in the event held in over one hundred countries. The event culminated in the production of a children's book entitled, "The magical world of soil biodiversity," through a book competition jointly organized by the GSP and the IUSS. This was an exciting achievement for the book is an effective strategy to engage young children in soil science in from an early age as future decision makers. To support activities at field level promoting sustainable soil management (SSM), the Global Soil Doctors Programme is available to provide farmer-to-farmer training, such as that already in place in Colombia, where the FAO and the GSP worked to validate the Soil Doctors' toolkit used in the programme. Another initiative is GLOSOLAN which is a participative network in which member laboratories and experts in soil analysis share their information and experiences to develop harmonized standards and training material that is published on the GLOSOLAN website and made available free of charge.</p>
<p>3. Protect black soils to achieve food and environmental security: Report on the Global Status of Black Soils</p>	<p>Black soils are among most threatened soil resources in the world. The depletion of these soils has consequences for food security, climate change and biodiversity loss. They are very fertile and thus considered, "the world crop basket" or, "giant pandas in cultivated farmlands," receiving increasing pressures for usage. They are intensively farmed all over the world, and cultivated for cereal, pasture, range and forage systems. Their significant soil organic carbon (SOC) content makes them very sensitive as sinks and sources of greenhouse gases. The recognition of the central role of black soil resources for food security, agricultural sustainability and productivity, and increased the awareness that they play a significant role in climate change adaptation and mitigation has inspired numerous projects, initiatives and global actions. Considering the importance of black soils and the risks of severe degradation, FAO's GSP established the International Network of Black Soil (INBS) in Rome, Italy, in March 2017. Thirty-one countries and the European Union joined the Network, while 82 experts from 26 INBS member countries contributed to develop the Report on the Global Status of Black Soils and Global Black Soil Distribution Map. The Report structure includes the definition of black soils, global distribution and regional features, their essential role in ensuring global food security and mitigating global climate change, the drivers and processes of degradation, the sustainable management and best available practices to stem degradation, and safeguard potential environmental and food production functions in line with farming policy recommendations.</p>
<p>4. Development and Implementation of the International Code of Conduct for the Sustainable Use and Management of Fertilizers</p>	<p>Fertilizers are defined as substances that are used to provide nutrients to plants through soil or foliar applications as well as through fertigation. In response to a request from the FAO Committee on Agriculture (COAG), the FAO and the ITPS developed and are implementing the Fertilizer Code, as per the recommendations of the World Soil Charter (WSC) and the Voluntary Guidelines for Sustainable Soil Management (VGSSM). Globally, both underuse and misuse of fertilizers contribute to food insecurity and can contribute to soil pollution, eutrophication of surface waters, and global climate change. The Code addresses fertilizer use and management, nutrient reuse and recycling, limits and testing regarding composition, access and distribution including labeling, and outreach efforts. An exhaustive consultation process was used to develop the Code including in-person and on-line processes, and an Open-Ended Working Group</p>

	<p>(OEWG). Final approval was granted at the 41<sup>st</sup> session of the FAO Conference in June 2019. A summary can be viewed here: <a href="https://www.youtube.com/watch?v=MILrme8hYQQ">https://www.youtube.com/watch?v=MILrme8hYQQ</a>. Implementation efforts are well underway, and data will be presented from the National Survey on the Use and Management of Fertilizers. The Code provides a framework for locally adaptable and voluntary guidelines to serve all stakeholders directly or indirectly involved with the use, production, and sale of fertilizers. Upon wide-spread implementation, the Code will contribute to the Sustainable Development Goals (SDGs) while improving soil health and enhancing the production of sufficient nutritious food for all.</p>
<p>5. The Global Maps of the Global Soil Partnership: from bottom to top.</p>	<p>In a world where the visualization of scenarios is important, soil maps are essential tools for decision-making. The GSP facilitates a participatory process involving member countries in the generation of global soil maps. In 2017 the GSOCmap was launched based on the SOC cookbook prepared by the ITPS and GSP. Various mapping methods were used by the countries, among them conventional upscaling, machine learning, ensemble models combining different DSM approaches and geostatistical methods. 66% of the countries used digital soil mapping techniques, which demonstrates the overall success of the capacity building programme undertaken by the FAO/GSP, and only 7% of the countries used conventional upscaling. The map produced forms a continuous surface of SOC distribution with acceptable differences around country borders. A similar approach was followed for the Global soil organic carbon sequestration potential (GSOCseq) and soil salinity map (GSASmap). The GSOCseq is being generated by modelling the potential of soils to sequester carbon under four management scenarios 20 years into the future. It is the first attempt to provide data to set attainable targets on soil carbon sequestration. Lastly, the GSASmap was launched in October 2021. The work on salt-affected soils so far shows that information on soil salinity is scant in most countries. This map has served to update country level maps while at the same time contributing to provide a basis for monitoring salt affected soils in light of future challenges, such as climate change.</p>
<p>6. FAO International Network of Salt-Affected Soils: joining efforts to manage salt-affected soils sustainably</p>	<p>Soil salinization and sodification, are major threats to global food security and to the achievement of the SDGs as identified in the SWSR co-authored by FAO and the ITPS in 2015.</p> <p>According to the available data, salt-affected soils occupy more than 8.7% of land surface (FAO GSASmap, 2021). They are widespread in arid, semi-arid and coastal regions that pose a great challenge for farmers living on these soils, since they evolve very fast in changing environments.</p> <p>To manage salt-affected soils sustainably, an integrated approach is required that converges soil, water, plant, and climate knowledge with practical solutions through the joint actions of scientists, international organizations, farmer associations, policymakers, and governments. To address this need, the International Network of Salt-Affected Soils (INSAS) was established under the umbrella of the GSP: <a href="https://www.fao.org/global-soil-partnership/insas">https://www.fao.org/global-soil-partnership/insas</a>.</p> <p>The main goal of INSAS is to address and facilitate the sustainable and productive management of salt-affected soils for current and future generations, in order to develop sustainable mechanisms to adapt to climate change</p> <p>INSAS has four working groups of experts addressing the issues of salt-affected soils through four major themes: (1) SAS&amp;Assessment: Mapping, assessing, and monitoring of salt-affected soils; (2) SAS&amp;SSM: Sustainable management of salt-affected soils (practices, policy); (3) SAS&amp;Crops: Halophyte agriculture and salt-tolerant crops; (4) SAS&amp;Water: Integrated soil and water management under saline/sodic conditions.</p> <p>The presentation at the 22<sup>nd</sup> World Congress of Soil Science will cover the main achievements of INSAS in developing the harmonized methodologies of analysis, monitoring and mapping; collecting best practices and other important activities.</p>
<p>7. Recarbonizing global soils: a Technical Manual of recommended management practices</p>	<p>Soil organic carbon (SOC) is a key indicator of soil health: productivity, biodiversity, and ecosystem services. It is a direct indicator of SDG 15.3.1 but it also affects other development goals. Several soil uses and management practices have proved to conserve or recover SOC around the world, but their performance is site specific, since they vary under different conditions, soils and climates. One outcome of the Global Symposium on Soil Carbon (GSOC17, FAO, Rome), was an open call for experts, launched by the ITPS and the GSP, to develop a Technical Manual of Best-management practices (BMPs) for SOC management. The contributions were reviewed by the GSP/ITPS, STC of the four per 1 000, CIRCASA, UNCCD/Science Policy Interface and a board of five experts. The published version reflects the efforts of more than 400 specialists from around the world including proved efficient standardized and locally tailored SOC management practices (73), 11 hotspots and 81 case studies around the world. The Manual is an element of the RECSOIL toolkit. Being the first attempt to gather the existing data on managing SOC content in different environments in a standardized format, it also includes advantages and constrains of each BMP. The full review identifies research gaps and limited results of some practices; therefore, it opens new research lines in SOC management. The Manual is not closed as it will be updated in the future.</p>

## **Annex III. Table of Contents for 2025 Status of the World's Soil Resources Report (SWSR)**

Draft 3.3

07-04-2022

Approved by the Editorial Board March 2022

Reviewed by the ITPS March 2022

### **Background**

*The first section is drawn from material adopted by the ITPS at meetings in March and November 2021.*

The 2025 SWSR has two objectives:

- 1) Summarize new information gathered since 2015 on the major threats to soil functions; and
- 2) Present an assessment of the regional distribution of the threats to soil functions.

The primary audience for the report is policymakers and soil managers who need science-based information about threats to soil functions and the capacities of SSM to address these threats.

The report will have two parts: a summary for policymakers and a main report.

The summary for policymakers will be complete after the main report is finalized.

The main report will have four sections. The first section will introduce the whole report. The second section will summarize new information on the major threats to soil functions. The third section will be a series of regional assessments on the status of threats to soil functions and of developments in SSM to address the threats in each region. The fourth and final section will summarize progress since 2015 and highlight research needs for the next ten-year period.

The summary of information on threats to soil functions (section 2) will primarily be authored by members of the GSP and present and past members of the ITPS. This section will build on the ITPS/FAO reports published prior to 2015. The ITPS/FAO reports on soil pollution, organic carbon and recarbonization, and soil biodiversity – with reports on salinization, black soils and erosion to come – have filled significant gaps in our knowledge. It will also draw on prominent reports by other UN organizations such as the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Committee on Science and Technology (CST) of the UN Convention to Combat Desertification (UNCCD). The GSP Secretariat and the ITPS have developed the expertise to produce these summaries and will complete the initial drafts of the compilations for the report.

The most important part of the SWSR 2025 is the regional assessment of the state of soils (section 3). This is the unique contribution of the SWSR process as there are other compilations of individual threats to soil functions. The assessments will be completed by panels of experts from each region. The expert panels will draw upon the regionally distributed membership of the ITPS, the network of Regional Soil Partnerships and the GSP, as well as the global reach of FAO. The structure of the expert panels will be determined by the ITPS at its meeting in the second half of 2022.



## Table of Contents - 2025 SWSR

*The Table of Contents has been designed to facilitate members of the primary audience (policymakers and soil managers) to locate pertinent information. Both the headings and the language used should be evaluated in this context.*

### Main Report

#### Section One: Introduction

1. Introduction
  - 1.1. Objective
  - 1.2. Structure of Report

#### Section Two: Update on Threats to Soil Functions

2. Soil functions and their contributions to life on earth
  - 2.1. Soil functions and ecosystem services
  - 2.2. Soils and the United Nations Sustainable Development Goals
    - 2.2.1. Food security and sustainable agriculture (SDG 2)
    - 2.2.2. Water security and resources (SDG 3,6)
    - 2.2.3. Human-induced climate change (SDG 13)
    - 2.2.4. Soil pollution and human and ecosystem health (SDG 3,6,14)
    - 2.2.5. Biodiversity (SDG 15)
    - 2.2.6. Sustainable use of terrestrial ecosystems (SDG 2,15)
    - 2.2.7. Sustainable cities (SDG 11)
  - 2.3. Soils and human societies
    - 2.3.1. Local, traditional, and indigenous knowledge
    - 2.3.2. Soils as an archive for human and environmental history
3. Threats to Soil Functions

*Note: The structure for each threat or sub-category of threats will follow the same sequence of sub-headings:*

1. *Definition of and processes responsible for the risk*
  2. *Global and regional modelling*
  3. *Climate change impact on the risk*
  4. *Human and environmental impact of the risk*
  5. *Economic impact of the risk*
- 
- 3.1. Overview of threats to soil functions  
*Emphasize human-induced soil change*
  - 3.2. Soil erosion
    - 3.2.1. Water
    - 3.2.2. Wind
    - 3.2.3. Tillage
    - 3.2.4. Mass movement
    - 3.2.5. Root crop harvesting
  - 3.3. Soil carbon change
    - 3.3.1. Mineral soils
    - 3.3.2. Organic soils including wetland soils and permafrost
    - 3.3.3. Soil inorganic carbon
  - 3.4. Soil biodiversity change

- 3.5. Nutrient mismanagement
    - Emphasize role of balanced nutrient management in food security*
    - 3.5.1. Nutrient surplus
    - 3.5.2. Nutrient mining
    - 3.5.3. Acidification
  - 3.6. Salinization and sodification
    - 3.6.1. Irrigation and drainage
    - 3.6.2. Alteration of hydrological conditions
    - 3.6.3. Coastal waterlogging
  - 3.7. Pollution
  - 3.8. Soil sealing and urbanization
  - 3.9. Physical degradation
    - Emphasize difference between compaction and sealing*
4. Direct and Indirect Drivers of Threats to Soil Functions
- 4.1. Overview of drivers
  - 4.2. Direct Drivers
    - 4.2.1. Cropland, pasture, and agroforestry management
      - 4.2.1.1. Change in extent including wetland drainage
      - 4.2.1.2. Tillage and residue management
      - 4.2.1.3. Agricultural inputs
      - 4.2.1.4. Irrigation and drainage
    - 4.2.2. Forest and tree plantation management
      - 4.2.2.1. Change in extent
      - 4.2.2.2. Silvicultural and harvest techniques
    - 4.2.3. Grazing land management
      - 4.2.3.1. Change in extent
      - 4.2.3.2. Stocking rate and rotation regimes
    - 4.2.4. Extractive industry development
      - 4.2.4.1. Pollutant discharge and spoil disposal
      - 4.2.4.2. Soil displacement
      - 4.2.4.3. Extraction of organic soil materials
    - 4.2.5. Urbanization and Infrastructure development
      - 4.2.5.1. Change in extent
  - 4.3. Indirect Drivers
    - 4.3.1. Demographic
    - 4.3.2. Economic
    - 4.3.3. Science, knowledge, and technology
    - 4.3.4. Institutions and governance
    - 4.3.5. Cultural
5. SSM in support of the UN SDGs
- 5.1. Food security and sustainable food systems (SDG 2, 11)
    - 5.1.1. Reducing agricultural soil erosion
    - 5.1.2. Optimizing nutrient sources and usage
    - 5.1.3. Closing yield gaps
    - 5.1.4. Reducing acidification
    - 5.1.5. Reducing salinization and sodicity
    - 5.1.6. Reducing loss of agricultural soil to urbanization

- 5.2. Water security and resources (SDG 3,6)
    - 5.2.1. Reducing runoff, flooding, and sedimentation
    - 5.2.2. Increasing water use efficiency in agriculture
  - 5.3. Human-induced climate change (SDG 13)
    - 5.3.1. Increasing the soil organic content (SOC) of soils
    - 5.3.2. Reducing nitrous oxide and methane emissions from soil
    - 5.3.3. Reducing CO<sub>2</sub> emissions from soil inorganic sources
  - 5.4. Soil pollution and human and ecosystem health (SDG 3,6,14)
    - 5.4.1. Reducing soil pollution and remediating polluted sites
    - 5.4.2. Reducing agrochemical pollution of water
  - 5.5. Biodiversity (SDG 15)
    - 5.5.1. Reducing loss of soil biodiversity
  - 5.6. Sustainable use of terrestrial ecosystems (SDG 2,15)
    - 5.6.1. Reducing loss of wetlands and organic soils
    - 5.6.2. Reducing wind erosion and desertification
    - 5.6.3. Reducing mass movement
  - 5.7. Enhancing resilience to climate change
- 6. Facilitating the Adoption of SSM
    - 6.1. Education and public awareness
    - 6.2. Soil and land governance
    - 6.3. Incentives for adoption
    - 6.4. Improved soil information systems
    - 6.5. Local, traditional, and indigenous knowledge systems

**Section Three: Regional Assessments of the Status of Soils in 2025**

*Section three will begin with a chapter outlining the assessment criteria used in the regional assessments. This chapter will be followed by seven regional assessments. Each regional assessment will follow the same structure. The Secretariat will provide each expert panel with data on changes in the direct drivers of threats to soil functions and the results of modelling of threats to soil functions for their region abstracted from global modelling studies. They will also be provided with a synopsis of the status of each risk from the 2015 report.*

- 7. Assessment Criteria for Regional Assessments
  - 7.1. Assessment of state of threats to soil functions
  - 7.2. Assessment of trend
  - 7.3. Assessment of uncertainty
- 8. Regional Assessment for region X
  - 8.1 Regional overview
    - 8.1.1 Characteristics of region and subregions
    - 8.1.2 Summary of status from 2015 SWSR Report
  - 8.2 Changes in the direct and indirect drivers of threats to soil functions
    - 8.2.1 Indirect drivers
    - 8.2.2 Cropland, pasture, and agroforestry management
    - 8.2.3 Forest and tree plantation management
    - 8.2.4 Grazing land management
    - 8.2.5 Extractive industry development

## 8.2.6 Urbanization and Infrastructure development

### 8.3 Regional status and trend of threats to soil functions

#### 8.3.1 Soil erosion

- 8.3.1.1 Water
- 8.3.1.2 Wind
- 8.3.1.3 Tillage
- 8.3.1.4 Mass movement
- 8.3.1.5 Root crop harvesting

#### 8.3.2 Soil carbon change

- 8.3.2.1 Mineral soils
- 8.3.2.2 Organic soils including wetland soils and permafrost
- 8.3.2.3 Soil inorganic carbon

#### 8.3.3 Soil biodiversity change

#### 8.3.4 Nutrient mismanagement

- 8.3.4.1 Nutrient surplus
- 8.3.4.2 Nutrient mining
- 8.3.4.3 Acidification

#### 8.3.5 Salinization and sodification

- 8.3.5.1 Irrigation and drainage
- 8.3.5.2 Alteration of hydrological conditions
- 8.3.5.3 Coastal waterlogging

#### 8.3.6 Pollution

#### 8.3.7 Soil sealing and urbanization

#### 8.3.8 Other threats

### 8.4 Trends in SSM

- 8.4.1 Examples of promising trends in SSM *by land use system*
- 8.4.2 Impediments to adoption of SSM
- 8.4.3 Strategic roadmap for Region X

## Section Four: Conclusions

### 9. Conclusions

- 9.1 Progress since 2015
- 9.2 Critical research gaps
- 9.3 Emerging technologies