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Report by the Chairperson on the main activities and outcomes of the work programme 2017-2018 of the Intergovernmental Technical Panel on Soils (ITPS)

Executive Summary

- This document contains the annual progress report of the ITPS, complementing those submitted to previous sessions of the Plenary Assembly. It provides a succinct overview of the main activities carried out by the Panel and the conclusions reached, since the current members were appointed by the PA at its 3rd session in June 2015 and are now completing their extended three-year term. The ITPS Chair is also due to make an oral presentation.
- Besides its formal working sessions, the ITPS often relies on the convening of smaller groups as appropriate to deal with specific assignments. In fact, as indicated below, a number of such groups are to deal with a follow-up on the "Status of the World's Soil Resources" report, and the implementation of Plans of Action under the GSP Pillars at both the global and regional levels.
- Section II of the document provides the revised ITPS work programme for 2018-19 for the information of the PA. Section III covers another key facet of the work of the Panel, e.g. its interface with other pertinent bodies and initiatives. Section IV contains the list of the new ITPS members for the period of June 2018 to June 2021while section V contains some conclusions and recommendations which the Panel deems pertinent to bring to the attention of the PA.
- The full reports of the seventh and eighth meetings of the ITPS can be consulted at: Seventh ITPS meeting October 2017 | Eighth ITPS meeting May 2018

Suggested action by the GSP Plenary Assembly

- The Plenary Assembly may wish to:
  - review and comment, as relevant, on the range of activities undertaken by the ITPS in the last twelve month period.
  - endorse the work plan 2018-2019 and invite donors and partners to support this work by providing financial and in-kind resources.
  - endorse the organization of two global symposiums: on sustainable soil management for

nutrient sensitive agriculture in 2019, and on soil biodiversity in 2020.

- review the progress made on the implementation of the GSOC17 outcome document and provide guidance accordingly.
- review the outcome of the Global Symposium on Soil Pollution and support the preparation of a Global Assessment of Soil Pollution to be led by the ITPS in collaboration with other UN panels and organizations.
- review the concept note for the assessment of the study on the economic benefits of SSM for farmers and other land users, as well as to identify best practices that prevent soil degradation
- endorse the list of 27 experts who will accordingly serve on the ITPS for a three-year term (from June 2018 to June 2021).

2.1 Main activities and outcomes 2017-2018

1. The PA endorsed in June 2017 the one-year extension of the 27 experts constituting the Intergovernmental Technical Panel on Soils (ITPS) to serve for a total mandate of 3 years (2015-2018), as recommended by the panel members.

2. Hence, during its third year of activities, the Panel carried out a number of tasks as follows:

- Preparation of a global assessment of the impact of plant protection products on soil functions and soil ecosystems;
- Preparation and subsequent follow-up of the first Global Symposium on Soil Pollution;
- Preparations for the second “Status of the World’s Soil Resources” report to be released at the end of 2025;
- Support, as appropriate, to the implementation of the GSP Plans of Action and the development of Regional Implementation Plans;
- Assessment of the potential of soil protection for increased resilience in a context of climate change (water retention, soil organic matter, soil biodiversity, carbon storage, soil fertility, etc.) at the global level;
- Study (by 2020) on the economic benefits of SSM for farmers and other land users, as well as to identify best practices that prevent soil degradation;
- Preparation of a zero draft Code of Conduct for the Use and Management of Fertilizers;
- Ensuring cooperative links with other scientific panels, such as the Science Policy Interface (SPI) of the UNCCD, the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC), as well as assisting with the implementation of the SDGs as appropriate.

A. Preparation of a global assessment of the impact of plant protection products on soils functions and soil ecosystems

3. The ITPS has been explicitly mandated by the PA to undertake an assessment, at the global level, of the impact of Plant Protection Products on soil functions and soil ecosystems. This assessment has been completed (Lead Author: D. Pennock, Canada) and was officially released on the occasion of World Soil Day 2017. The full document is available online at http://www.fao.org/documents/card/en/c/I8168EN/.

B. Preparation of the first Global Symposium on Soil Pollution

4. The ITPS focused on ensuring the essential scientific and technical underpinnings of the symposium, jointly with the other co-organizers of this event. A detailed report on this activity is presented in section 2.3.1.

C. Preparation of the 2nd "Status of the World's Soil Resources" report

5. Despite the change in the date of the delivery of this report (2025), the ITPS already organized working groups to start the preparation of this substantive work. Considering the change of ITPS members from June 2018, the work plan for the preparation of this report will have to be discussed and agreed by the new ITPS members.

D. GSP Plans of Action and Regional Implementation Plans

6. The ITPS is fully conscious of the importance of maintaining the highest scientific and technical standards during the implementation phase of the five GSP Plans of Action. It is also worth recalling that Regional Implementation Plans are to guide more concrete actions at regional and country levels. Therefore, the ITPS has been closely supporting and monitoring the implementation at both global and regional levels. Due recognition of priority regions (such as Africa) should be recommended, especially in view of the limited available resources.

7. In this context, five working groups of the ITPS have been active, pooling the necessary competencies and putting them at the service of implementation requirements. These groups are closely following the implementation of the Global Implementation Plans (GIPs) and, through members from the pertinent regions, provide advice and support to the Regional Implementation Plans (RIPs).

8. Working Group (WG) participants are as follows:

- **Pillar 1:** Dan Pennock (chair); Siousa Moala Halavatau, Fernando García-Préchac, Talal Darwish, Juan Comerma, Isaurinda Baptista, Ahmad Muhaimeed, Saeb Khresat, Rainer Horn
- **Pillar 2:** Maria de Lourdes Mendonça Santos Brefin (chair); Gary Pierzynski, Pavel Krasilnikov, Amanullah, Botle Mapeshoane, Oneyda Hernandez Lara, Siosiua Moala Halavatau, Fernando García-Préchac, Brajendra
- **Pillar 3:** Brajendra (chair); Miguel Taboada, Juan Comerma, Isaurinda Baptista, Gary Pierzynski, Martin Yemefack, Neil McKenzie, Nsalambi V. Nkongolo, Kazuyuki Yagi; Siousa Moala Halavatau
- **Pillar 4:** Neil McKenzie (chair); Maria de Lourdes Mendonça Santos Brefin, Miguel Taboada, Bhanooduth Lalljee, Dan Pennock, Peter De Ruiter, Ahmad Muhaimeed, Gunay Erpul, Gan-Lin Zhang
- **Pillar 5:** Bhanooduth Lalljee (chair); Juan Comerma, Ahmad Muhaimeed, Martin Yemefack, Gary Pierzynski, Gan-Lin Zhang, Neil McKenzie, Pavel Krasilnikov, Amanullah, Brajendra, Peter De Ruiter.

E. Assessment of the potential of soil protection for increased resilience in a context of climate change (water retention, soil organic matter, soil biodiversity, carbon storage, soil fertility, etc.) at the global level

9. The ITPS has also been explicitly mandated by the PA to undertake such an assessment but it is still on hold due to the lack of resources. Therefore, the ITPS suggests that this task is fully addressed by the new members.

F. Study (by 2020) on the economic benefits of SSM for farmers and other land users, as well as to identify best practices that prevent soil degradation

10. At the fifth PA, the ITPS has been tasked to prepare a study (by 2020) on the economic benefits of SSM for farmers and other land users, as well as to identify best practices that prevent soil degradation. The outcome of this study should be to justify possible motivation and incentive measures for the adoption of more sustainable soil management (SSM) practices. A specific working group has been established within the ITPS to work on the report with the following members: Mr. Amanullah, Mr. Brajendra, Mr. Comerma, Mr. Darwish, Mr. Erpul, Mr. Horn, Mr. Krasilnikov, Mr. Lalljee, Ms. Mendonca Santos Brefin and Mr. Pennock, and under the co-leadership of Mr. Krasilnikov (administratively) and Mr. Amanullah (scientifically). The group developed a concept note that was then endorsed by the 8th working session of the ITPS for consideration of the PA (see Annex 1).

G. Preparation of a zero draft Code of Conduct for the Use and Management of Fertilizers

A full description of this activity is provided in **GSPPA:VI/2018/3 (3.1.2.1).**

2.2 Work programme for 2018-19

11. The ITPS work plan until mid-2019 would consequently include the following:

- five working groups assigned to each pillar addressing global and regional implementation plans from the perspective of the ITPS, with an increased focus on Africa, as a priority region;
- four working groups to prepare reports on the progress made in addressing the four priorities identified in the SWSR report; also WG1 and WG2 to support the SPI-UNCCD; WG2 and WG4 to participate in the follow-up of the joint ITPS-IPCC-SPI-UNCCD GSOC symposium;
- all ITPS members to contribute to a study on the economic benefits of SSM for farmers and other land users, as well as identify best practices that prevent soil degradation. This study will be released by 2020, in order to feed into the second SWSR to be completed in 2025;
- to initiate jointly with UN CBD a new Global Soil Biodiversity Assessment (GSBA) to be completed by 2022, also contributing relevant information to the second SWSR;
- continue the implementation of the GSOC17 recommendations including the establishment of a Global Soil Organic Carbon Monitoring System and pursue the implementation of the GSOP18 outcome document “be the solution to soil pollution”;
- advance activities under the GSOCmap and GLOSIS, including the preparation of applied maps such as the potential for soil organic carbon sequestration, global soil erosion assessment, global soil salinity assessment and mapping important soil properties such as pH, soil texture, and others;
- contribute to the first order draft of the second edition of the SWSR for the consideration of the PA in 2020; and
- to complete for the PA 2019 the outstanding global assessment on the potential of soil protection for increased resilience in a context of climate change (water retention, soil organic matter, soil biodiversity, carbon storage, soil fertility, etc.).

2.3 Interface with other pertinent bodies and initiatives

12. The ITPS has been explicitly mandated to provide scientific and technical advice to other UN organizations and bodies with an interest in soils.

13. Therefore, the GSP Secretariat has worked towards continuing fruitful collaboration between the ITPS and other relevant panels, such as the IPCC, IPBES and the SPI of UNCCD. In particular, the ITPS can enhance the work of these panels by providing specific knowledge and expertise in soil related issues. The GSP Secretariat and the ITPS succeeded in establishing structured collaboration arrangements with the SPI of UNCCD, IPBES and the IPCC, including via the joint symposium on Global Soil Organic Carbon, with representatives of these organizations being present during the sixth ITPS working session (March 2017).

14. A new area of collaboration has been developed in relation to soil pollution. Soil pollution issues remain largely understated in global fora and the ITPS is the adequate body to address the large knowledge gaps that persist at the global level in collaboration with existing initiatives. The 5th PA has therefore endorsed the preparation of a report to reduce knowledge gaps on soil pollution, including on the anthropogenic sources of soil pollution. The report’s main objective is to evaluate the risks and impacts that soil pollution has on human health and on the environment. Based on this evaluation, the GSP should identify prevention and management measures linked to soil pollution that could be promoted. As a first step towards the compilation of such a report, a major scientific symposium has been organized jointly with other relevant organizations, like UN Environment and WHO, following the very successful model developed for the joint ITPS, IPCC, SPI-UNCCD symposium on Global Soil Organic Carbon.

15. **Collaboration with the SPI of UNCCD**

Following the symposium on Global Soil Organic Carbon in 2017, a joint outcome document has been finalized and released to the public, and the following activities have been completed:

- A chapter on soils was contributed by the ITPS to the Global Land Outlook, which has been released by the UNCCD secretariat on the occasion of UNCCD COP 13 in September 2017.
- The ITPS delivered a new global soil organic carbon map at the end of 2017, as direct support for the indicator 15.3 of the SDGs and the UNCCD endorsed metrics for the assessment of land degradation neutrality (LDN).
- A full progress report on the collaboration between ITPS and UNCCD has been presented at UNCCD COP 13 by the ITPS Chair.
- Further collaboration between the UNCCD SPI and the ITPS has been formally included by the UNCCD COP 13 in the future work programme of the SPI.

16. **Collaboration with IPBES**

Since the Secretariat facilitated the nomination in 2015 of the ITPS Chairperson as co-chair of the IPBES Land Degradation and Restoration Assessment (LDRA), cooperation between the ITPS and IPBES has been developing. The ITPS has provided a detailed review of the first and second order drafts of the assessment. Furthermore, the ITPS and the GSP Secretariat have jointly hosted the 3rd and final LDRA Author Meeting (17-21 July 2017) at FAO Headquarters. This collaboration has resulted in the final endorsement by the IPBES-6 Plenary Assembly of the Thematic Assessment on Land Degradation and Restoration (LDRA) in Medellin, Colombia, 16-26/03/2018. The Summary for Policy Makers is available here https://www.ipbes.net/sites/default/files/downloads/spm_ldr_unedited_advance_28march2018.pdf

17. **Collaboration with IPCC**

This collaboration, after an initial period of difficulties, is currently the most advanced and effective, due to the increased attention to soils within the climate change debate and negotiations. The ITPS has been formally admitted as an observer organization within IPCC and is therefore empowered to propose experts for the various IPCC assessments relevant to soils. In particular, the recently launched IPCC Special Report on Climate Change and Land requires extensive soil related expertise that can be provided by the ITPS. Three ITPS members have been nominated as experts within the on-going IPCC reporting cycle.

18. **Collaboration with the 4pour1000 initiative**

The ITPS has been included as a permanent observer in the Science and Technology Committee of the 4pour1000 initiative of France. Further collaboration is currently under development.

19. **Collaboration with the Global Soil Biodiversity Initiative (GSBI)**

The ITPS has been invited to deliver the opening keynote presentation at the 2nd Global Soil Biodiversity Conference in Nanjing, China, October 2017. Further strengthening of the soil biodiversity component has been discussed within the GSP in close collaboration with the GSBI, envisaging the joint compilation of a first Global Soil Biodiversity Assessment (GSBA).

2.3.1 Report of the Global Symposium on Soil Pollution

20. The ITPS and the GSP Secretariat led the organization of the first Global Symposium on Soil Pollution (GSOP18) as mandated by the fifth PA of the GSP. The Global Symposium on Soil Pollution was jointly organized by the:

Food and Agriculture Organization (FAO) of the United Nations

UN Environment (UNEP)

World Health Organization (WHO)

Secretariats of the Basel, Rotterdam and Stockholm Conventions (BRS)

21. The symposium was held at FAO headquarters on 2–4 May 2018. It was attended by 525 participants (40 percent women, 60 percent men) from 100 countries including representatives from FAO member states, the organizing institutions, academic and research communities, relevant panels, private sector and civil society, as well as scientists and practitioners working in soil pollution assessment, remediation, and related fields.

22. The GSOP18 was a milestone event, following a very collaborative and inclusive approach. This symposium constituted a concrete contribution to the implementation of the UNEA3 declaration “Managing soil pollution to achieve Sustainable Development”. The major conclusions and recommendations as well as the way forward will be available in the outcome document “be the solution to soil pollution”.

23. A summary of the main conclusions and recommendations are:

- it has been scientifically demonstrated that soil pollution poses a worrisome threat to agricultural productivity, food safety, and human health. Tackling soil pollution is essential to contribute to the achievement of the Sustainable Development Goals (SDGs), therefore it requires joint efforts to prevent, minimize and remediate it;
- the main source of contaminants to soils come from human activities (industrial activities including mining, smelting and manufacturing; domestic, livestock and municipal wastes; pesticides, and fertilizers used in agriculture; petroleum-derived products that are released into or break down in the environment; fumes generated by transportation — all contributing to the problem); in this light , bold actions should be pursued to address them, not only as regards dangerous emerging pollutants, but also residual contaminants;
- the potential of soils to cope with pollution is limited; the prevention of soil pollution should be a top priority worldwide and when present, remediation actions under the framework of sustainable soil management should be implemented;
- awareness raising on the importance of soils and the risks posed by soil pollution to foodsystems, the environment and human health should constitute a key activity. These efforts should cover different target groups including decision makers and the general public (children and youth as a priority);
- there is a need to build case studies in the different regions to address soil pollution in a complete and holistic manner (from assessment to remediation), to build scientific evidence and promote solutions;
- to implement a global assessment of the status of global soil pollution using a country-driven process in line with UNEA3 declaration and to promote the establishment of national soil information systems that include data/information on contaminants;
- to include soil pollution assessment and minimization measures in the Soil Doctors Programme in order to support land users in maintaining healthy soils under local conditions for long-term benefits;
- to advocate for the implementation of existing guidelines, such as the Codex Alimentarius, the revised World Soil Charter, the Voluntary Guidelines for Sustainable Soil Management, the Code of Conduct on Pesticide Management, the Global Action Plan on Antimicrobial Resistance among others, to ensure safe food in the face of emerging soil contaminants;
- to establish a working group to develop guidelines for the management of polluted soils, including a database of good practices for addressing soil pollution (management and remediation);
- to support the development and implementation of tools and guidelines that contribute to the fight against soil pollution, for instance the International Code of Conduct for the Use and Management of Fertilizers;
- to establish an expert and multi-stakeholder working group to develop feasible and regionally contextualized guidelines for assessing, mapping, monitoring and reporting on soil pollution;
- to implement capacity building and training activities covering the full cycle of soil pollution – from its assessment to its remediation - including the strengthening of facilities for data analysis and management;
- to implement the activities of the Global Soil Laboratory Network (GLOSOLAN), including harmonized methods to identify and measure soil contaminants.

24. The ITPS sought to ensure the essential scientific and technical underpinning of the symposium, jointly with the other co-organizers of this event, the UN Environment, the Secretariats of the Basel, Rotterdam and Stockholm Conventions, and the World Health Organization.

25. The ITPS should take the leading role in the implementation of the recommendations of the outcome document "be the solution to soil pollution" (summarized above) as a direct contribution to the implementation of the UNEA 3 declaration.

2.3.2 Implementation of the GSOC17 Outcome document

26. The GSOC17 gathered more than 400 participants from 111 countries, including representatives of FAO member states, organizing institutions, the private sector and civil society, as well as scientists and practitioners working on soil organic carbon (SOC) and related fields. Participants from across the globe engaged actively by presenting the results of studies demonstrating the potential and challenges of managing and monitoring SOC and by discussing and developing the key messages reflected in the outcome document. The 8 recommendations made based on this work are aimed at supporting the development of policies and actions to encourage the implementation of soil and land management strategies that foster the protection, sequestration, measurement, mapping, monitoring and reporting of SOC. The ITPS and the GSP Secretariat are currently addressing these recommendations with several activities as follows:

27. Capacity development and training activities are being organized for countries to develop national reference values for SOC stocks, as well as the necessary data management capacities and facilities. The GSP has been conducting capacity development and training in the frame of the GSP capacity Development Programme. The programme has benefited 105 countries and ensured 60% of potential area coverage. The GSP Programme is playing an important role in the process of building the Global Soil Information System and its components. It has sought to introduce the most recent concepts and techniques for data management, digital soil mapping (DSM) and modelling, to soil experts who work at national soil science institutes. In the late 2016 and 2017, the programme mainly focused on on-the-job training for the preparation of the GSOCmap and resources were mobilized to implement training on digital soil organic carbon mapping.

28. A working group is to develop feasible and regionally contextualized guidelines for measuring, mapping, monitoring and reporting on SOC that can be adapted locally to monitor SOC stocks and stock changes to support management decisions. In March 2018, the GSP Secretariat launched an open call for experts to establish the working group. The guidelines need to build on existing scientific guidance, such as that developed by the IPCC, and they should be sufficiently simple to enable implementation in diverse contexts and scales, and taking into consideration differing local and national capacities in countries. Practical guidance should also include elements to support carbon-pricing mechanisms by relying on the measurement of SOC stocks to assess stock changes, rather than using only stock change factors based on land use and management practices. More than 150 experts responded to the call. The GSP Secretariat is now outlining the table of content and the work strategy so that the group can start developing these much-needed alternative guidelines.

29. A working group is to produce a technical manual for soil organic carbon management at regional and sub-regional levels. The ITPS and GSP Secretariat made a call for experts, and 220 experts joined the working group via electronics means. The work is directed by lead-authors divided by major land use systems (unmanaged and protected areas, forestry, agricultural, grasslands, wetlands, livestock, urban, etc.). The formulation of recommendations is based on scientific evidence form the best management practices and systems that promote the preservation and, wherever possible, the increase of SOC stocks in all land uses at regional, sub-regional and national levels. These contributions should be adapted to site characteristics and land user needs, but they should also consider cost-benefit analyses and social impacts. The priorities reflected in the Regional Implementation Plans of the Regional Soil Partnerships will be thoroughly taken into account. This manual will significantly contribute to recommendations 3, 4 and 8 of the GSOC17 Outcome Document. These recommendations are related to the inclusion of the full GHG balance and possible interactions between the C and N cycles, appropriate soil and land management practices for SOC protection and sequestration, and support land-users.

30. The different inputs will be compiled into a technical manual on SOC management to be published at the end of the process (See Table 1).

Table 1. Timeline for the preparation of the technical manual on SOC management.

Working structure of the technical manual	• Introduction and preparation process of the technical manual. • Points of consideration when studying, recommending and adopting sustainable soil management practices that target the preservation and/or enhancement of SOC. • Recommended management practices and actions for preservation and/or

	enhancement of SOC. • Experiences with diverse incentivizing mechanisms for large scale practice adoption. • Future directions and identified gaps.
Timeline (2018)	• First draft of each chapter – by 30 June 2018 • Editing to harmonize chapters (ITPS/GSP Secretariat, feedback process with lead authors) - by 30 July 2018. • Review by ITPS/UNCCD-SPI/IPCC and other stakeholders – by 30 August 2018. • Preparation of final draft – by 30 September 2018. • Final review and clearance by ITPS – by 30 October 2018 • Layout and printing – by 30 November 2018. • Launch of the Guidelines during the World Soil Day – 5th December 2018.

2.3.3 Proposals for further global symposiums on 2019 and 2020

31. Building on the successful Global Symposiums on Soil Organic Carbon and on Soil Pollution, held in 2017 and 2018 respectively, the ITPS and GSP are committed to organize further symposiums to build scientific evidence around the ten soil threats identified by the Status of the World's Soil Resources (SWSR).

Global Symposium on Sustainable soil management for nutrition-sensitive agriculture (soil fertility) 2019

32. One of these threats is nutrient imbalance, which occurs when nutrient inputs are either insufficient or in excess. Infertile soils and the insufficient supply of nutrients to crops is one of the reasons why some areas of the world experience yield gaps, which negatively contribute to food security and nutrition. Nutrient imbalance also contributes to malnutrition and micronutrient deficiencies. This has led to the need for a global symposium on sustainable soil management for nutrition-sensitive agriculture, a food-based approach to agricultural development that highlights the importance of micronutrients for human nutrition, and sheds light on the issue of hidden hunger. Soils play a critical role as they provide nutrients and water to plants and microorganisms. Micronutrients provided by soils are crucial for plant development and growth. However, soils are deteriorating worldwide and becoming less fertile, hence providing less nutrients to plants, animals and people who rely upon them. Recent assessments such as the Status of the World's Soil Resources report (FAO/ITPS 2015) have demonstrated the extent to which soil fertility has suffered from unsustainable management practices. The many aspects of soil fertility and its link to nutrition will be addressed in a publication linked to the symposium, which will touch upon the technical side of nutrition-sensitive agriculture: "sustainable soil management for nutrition-sensitive agriculture", but also its environmental, economic and social aspects. The outcomes of this symposium will therefore contribute to SDG 1 on poverty, SDG 2 on zero hunger and SDG 3 on good health and well-being.

Global Symposium on Soil Biodiversity 2020 (in collaboration with the International Convention on Biodiversity)

33. The revised World Soil Charter highlights the importance of soil management for safeguarding ecosystems services and biodiversity, and the Status of the World's Soil Resources (SWRS) identified the loss of soil biodiversity as one of the ten soil threats. The ITPS, together with other UN panels and organizations, in particular the Convention on Biological Biodiversity (CBD) and the international Initiative of Soil Biodiversity for Food and Agriculture, plans to organize a Global Symposium on Soil Biodiversity to be held in March 2020. Soil biodiversity includes a range of vertebrate and invertebrate organisms (plants, algae, bacteria and fungi), which form a complex biological process. This biodiversity below ground plays a key role in food security, nutrition and underpins a multitude of ecosystem functions and services critical to sustain both agricultural land productivity and the broader ecosystems and landscapes. It is also key to soil formation; reversing land degradation; supporting nutrient, carbon and water cycling; disease and pest regulation; off-farm pollution reduction and providing products such as antibiotics. While soil biodiversity is vital, it is often forgotten or understated. Soil biodiversity is relevant to many global commitments, including the sustainable development goals, disaster risk reduction, combating desertification and climate change. This symposium, along with a linked publication on soil biodiversity, aims to address *inter* alia the latest research on the subject and the impacts of biodiversity loss.

34. For 2021, the ITPS suggested to organize a symposium on soil erosion, considering that this is the main threat affecting global soils.

2.4 Appointment of new members of the ITPS

35. A call for nominations was sent out on 28 February 2018 - together with the invitation to the Plenary Assembly - requesting GSP partners to send proposals. A total of 78 nominations were received by the Secretariat.

36. After a rigorous assessment against the established criteria, a short list was communicated to FAO Members through the Regional Chairs, for final selection of experts in respective regions, bearing in mind that - apart from suitable qualifications - the ITPS should reflect proper regional coverage and gender balance.

37. The final lists of experts for all regions were given to the Secretariat so that the Assembly could proceed with the formal appointment of members.

38. The results from this process are presented below:

Africa

- ☐Mr. Edmond Hien (Burkina Faso)
- ☐Ms. Generose Nziguheba (Burundi)
- ☐Ms. Lydia Mumbi Chabala (Zambia)
- ☐Mr. Matshwene E. Moshia III (South Africa)
- ☐Mr. Nsalambi Vakanda Nkongolo (Democratic Republic of Congo)

Asia

- ☐ Mr.Ashok K Patra (India)
- ☐ Mr.Chencho Norbu (Bhutan)
- ☐ Mr.JIN Ke (China)
- ☐ Mr.Jun Murase (Japan)
- ☐ Mr.Mohammad Jamal Khan (Pakistan)

Europe

- ☐Ms. Costanza Calzolari (Italy)
- ☐Ms. Ellen Ruth Graber (Israel)
- ☐Ms. Maria Konyushkova (Russian Federation)
- ☐Mr. Peter de Ruiter (The Netherlands)
- ☐Ms. Rosa Poch (Spain)

Latin America and the Caribbean

- ☐Mr. Adalberto Benavides Mendoza (México)
- ☐Mr. Fernando García Préchac (Uruguay)
- ☐Ms. Lúcia Helena Cunha dos Anjos (Brazil)
- ☐Ms. Martha Marina Bolaños Benavides (Colombia)
- ☐Mr. Samuel Francke Campaña (Chile)

Near East

- ☐Mr. Kutaiba M. Hassan (Iraq)
- ☐Ms. Rafla Sahli Epse Attia (Tunisia)
- ☐Mr. Sa'eb AbdelHaleem Khresat (Jordan)

North America

☐Mr. David Allen Lobb (Canada)

☐Mr. Gary Pierzynski (United States of America)

South West Pacific

☐ Ms. Megan Balks (New Zealand)

☐ Mr. Siosiua Halavatau (Tonga)

2.5 Conclusions and recommendations

39. The ITPS is in its second period of activity, now extended to three years, and is by now a well-recognized instrument at the service of the international community engaged in sustainable development. The transition from the first to the second period was smooth, i.e. without major disruption of working procedures, thanks to the partial renewal of the previous membership, allowing for the necessary continuity.

40. A similar smooth transition is recommended in the selection of the third team of ITPS members, assuring that a sufficient number of outgoing members is re-confirmed in their second mandate within the newly appointed ITPS.

41. An open issue remains the need to rotate the venue of ITPS working sessions between FAO regions. The Secretariat will consider this option whenever feasible, as it could generate additional local outreach of the ITPS activities.

42. Finally, the fast growing number of requests for ITPS activities implies the imperious need to increase financial resources for additional studies and specific working group meetings to fully address challenging tasks.

Annex 1: Concept note for the preparation on an assessment of the "Economic benefits of sustainable soil management for farmers and other land users, as well as to identify best practices that prevent soil degradation

1. Introduction

Sustainable soil management (SSM) is an evident demand of our time, as stressed in the revised World Soil Charter (FAO, 2015). The framework for SSM application in agriculture is further outlined in the Voluntary Guidelines for Sustainable Soil Management (VGSSM), a broad document endorsed by the 155th session of the FAO Council in 2016.

Though the necessity for SSM is widely recognized, its practical application is commonly jeopardized by the increase in cost required for crop production under SSM. Extra costs are often needed for the additional measures to protect soils in various ways, as well as the often-needed change in farming equipment which requires initial investment (see Section 3). Most agriculturalists in the world do not have available capital to cover the cost of SSM, especially if their investment would not be recompensed in the future. There are three basic questions to be answered if we want to make SSM attractive for farmers:

1) Is it possible to decrease the cost of SSM compared to that of conventional soil management through advanced technology application and less input of agrochemicals?
2) Could the cost of SSM implementation be compensated in the future by higher or more profitable production?
3) Could farmers be compensated by society for public benefit of SSM implementation?

Each of these questions should be properly addressed using the best available science and expertise.

2. Biophysical background

The revised World Soil Charter defines SSM as follows:

"Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing the soil functions that enable those services or biodiversity."

The main issues to be addressed for maintaining these services listed in the VGSSM include soil erosion control, soil structure preservation, soil cover maintenance, soil nutrient enrichment, soil biodiversity maintenance, soil water regulation, soil contamination reduction, and minimizing the loss of agricultural soils. Each of these issues requires certain measures or management practices which should adhere to the above definition in order to be considered sustainable. Therefore, as a first step in assessing the economic effects of SSM, soil management practices need to be assessed against this definition and a set of suitable practices listed. A preliminary set of measures is summarized in Table 1.

Table 1. Sustainable soil management practices, their contribution to soil-related ecosystem services and functions, and the consequences of ignoring them[1]

SSM practices	**Aim, functions and services addressed**	**Possible consequences of no-action**
Land-use change reduction	Erosion control, biodiversity maintenance, prevention of SOC losses	Possible soil erosion, productivity decline, soil organic carbon and nutrient loss, greenhouse gas emission, decrease in soil biodiversity
No-till or conservation tillage application[2]	Erosion control, nitrogen enrichment, prevention of SOC losses, improved	Possible soil erosion, soil organic carbon and nitrogen loss, greenhouse gas emission,

[1] The Table does not include political actions or prerequisites for SSM implementation such as soil monitoring
[2] Consider the potential risk of soil and water contamination through increased pesticide application

	soil physical properties, increased soil biodiversity	decrease in soil biodiversity
Strip cropping	Erosion control	Possible erosion, soil organic carbon and nutrient loss
Terrace formation and maintenance	Erosion control, soil water regulation and run off control	Possible soil erosion, organic carbon and nutrient loss, crop productivity reduction due to drying
Grass waterway formation	Erosion control, soil water regulation	Possible soil erosion, organic carbon and nutrient loss
Utilization of riparian buffers and protecting wetlands	Erosion control, contamination reduction	Possible reduction in food and feed quality
Reduction of heavy machinery use	Soil structure preservation	Excessive and deep reach compaction, possible productivity decline due to compaction and water erosion, off-site affects such as water eutrophication
Managing livestock movement and grazing intensity	Soil structure preservation, nutrient enrichment, organic carbon accumulation	Excessive and deep reach compaction, possible productivity decline, greenhouse emission
Minimization of soil disturbance and careful restoration of disturbed topsoil	Soil structure preservation and biodiversity maintenance, erosion control	Possible productivity decline and biodiversity loss
Sowing or planting cover crops	Soil cover maintenance, nutrient enrichment, organic carbon accumulation, biological activity and diversity maintenance, lower fertilizer use	Possible productivity decline, soil organic carbon and nutrient loss, greenhouse gas emission, decrease in soil biodiversity
Improved fallow plants application	Soil cover maintenance	Possible productivity decline, soil organic carbon and nutrient loss, decrease in soil biodiversity
Decreasing cover burns	Soil cover maintenance	Possible soil organic carbon and nutrient loss, greenhouse gas emission, decrease in soil biodiversity
The use of nitrification and urease inhibitors	Nutrient enrichment, improved water quality	Possible productivity decline, greenhouse emission
The use of slow release fertilizers	Nutrient enrichment, lower nutrients loss	Possible productivity decline
The use of inoculants that promote atmospheric nitrogen fixation and phosphorus solubilisation	Nutrient enrichment, less use of fertilizers	Possible productivity decline, greenhouse gas emission
Fertilizer application methods and timing	Nutrient enrichment, contamination reduction, limit losses and promote crop nutrient uptake	Nutrient depletion, possible productivity decline, greenhouse gas emission
The use of organic amendments and agricultural by-products	Nutrient enrichment, biodiversity maintenance, lower fertilizer use	Possible productivity decline, soil organic carbon and nutrient loss, deterioration of soil physical properties, increase in surface water runoff, decrease in soil biodiversity
Crop rotation improvement		
-Including crops with dense and fibrous root systems in crop rotations	Soil structure preservation	Possible productivity decline, soil organic carbon and nutrient loss, decrease in soil biodiversity

-The utilization of crop rotations with legumes	Nutrient enrichment, lower fertilizer use	Possible productivity decline, nutrient loss, decrease in soil biodiversity
-The management of previous crops, forages and fallows to increase soil water availability at sowing	Soil water regulation	Possible productivity decline, decrease in soil biodiversity
Effective liming	Soil pH increase, nutrient enrichment, decreasing Al toxicity, improvement of soil physical properties	Acidification, possible productivity decline
Regulated pesticide use	Biodiversity maintenance, contamination reduction, improved soil and water quality	Possible reduction in food and feed quality
Application of biological amendments	Biodiversity maintenance, organic carbon accumulation	Possible productivity decline, soil organic carbon and nutrient loss, decrease in soil biodiversity
Improved irrigation conveyance, distribution, and field application methods (e.g. drip irrigation) that reduce evaporation	Soil water regulation, increased water use efficiency, reduced erosion	Possible productivity decline, decrease in soil biodiversity
Installation and maintenance of surface and sub-surface drainage systems	Soil water regulation, reduced erosion	Possible productivity decline, decrease in soil biodiversity, increased greenhouse gas emission
Minimization of outflows of irrigation water from paddy fields after fertilizer and pesticide applications	Soil water regulation, contamination reduction	Possible reduction in food and feed quality
Construction of physical barriers such as grass strips and coastal forests in coastal areas	Soil water regulation	Possible productivity decline
Agroforestry techniques, arboreal wind breaks	Reduced wind erosion	Possible productivity decline, negative effect on humans by dust storms

3. Economic background

The implementation of SSM practices has its price. The broad concept of Economics of Land Degradation (ELD) is based on the contrast between “action” that is implementation of SSM practices, and “inaction” that is conventional farming or “business as usual” (von Braun et al., 2013). Though in this report we concentrate mainly on soils and on the management practices that benefit soil productivity and health, for economic assessment we have to include into calculation the entire cycle of land management including machinery and fuel cost, insurance and many other cost each farmer has to pay. By default, it is considered that “action” costs more than “inaction”, which in practice is not necessarily true: for example, the recommendation to avoid land use change and soil disturbance does not lead to direct costs, though possibly leads to lost profit. Nonetheless, the implication of extra cost of SSM when present is the main barrier for the implementation of the practices recommended for sustainable farming.

To convince farmers to apply recommendations for SSM we should prove that investment in operations to combat soil degradation and decline in soil-related ecosystem services will be compensated by profit from increased crop productivity or better market performance and/or through the improvement of other ecosystem services. There is no difference whether we show the benefit as an increase in yield (and/or other ecosystem services) due to SSM application or a decrease due to the lack of proper management. The main benefit of SSM implementation is the increased sustainability of farming: non-sustainable conventional farming may increase yields on a short-term basis, but over the long term the yield would decline, or additional investment would be required to maintain soil productivity at the same level. That is why it is important to assess the cost and benefit of SSM using a long-term planning horizon, at least 20-30 years.

Another important benefit of SSM is the increase in food quality. Organic food production has sustainable soil management as a pre-requisite for certification of organic farms. Obviously balanced use of fertilizers and plant protection products will benefit the quality any food independently of organic certification. Agricultural products of higher quality may be sold on a higher price, thus compensating the cost of SSM application. Also, the consumption of more healthy food benefits human health, thus contributing to the improvement of the quality of life of humans that may be regarded as an indirect added value of SSM.

According to the current concept of total economic value (TEV) the cost of any action includes not only direct market cost of the output products, but also indirect values such as ecosystem functional benefits, future direct and indirect use values, values for leaving use and non-use values for posterity, and value from knowledge of continuing existence. The ELD approach widely uses the TEV concept to show the importance of reducing the rate of land degradation: the contribution of indirect use plus non-use values in many cases exceeds direct use value of an agroecosystem. However, the beneficiary of the profit other than direct use value is humankind and not the particular farmer who bears all the expenses. Thus, the mechanisms of transferring some part of the public goods produced due to SSM to the farmer should be discussed. The discussion of payment for SSM is not strictly private but of public order. Lands and soils have social functions and we cannot forget the role of governments in the implementation of economic and institutional mechanisms promoting land conservation.

4. Low-cost SSM practices

The implementation of SSM may vary in cost. “Passive” SSM may include, for example, the rejection of land use change or avoiding the use of some management practices like heavy machinery application or deep plowing. However, just avoiding management that is potentially destructive for soils is just a prerequisite for farming sustainability and should be followed by additional activities to maintain soil productivity, which do have a cost. Also, the rejection of land use change commonly has economic consequences such as lost profit. In places awareness rising might be enough for preventing farmers from application of soil-destructive practices, but a common challenge is that even mere change in management practice would lead to additional costs. For example, rejection of burning stubble residues commonly favors soils carbon accumulation, biodiversity, and protects soil from erosion. However, in this case additional measures should be taken for weeds and diseases control. Thus, SSM cannot be regarded as completely free of charge, even if no formal action is taken.

The other situation where minor investment is required is the use of specific crop rotations, e.g. including legumes. The cost of such rotations does not exceed the cost of other, less sustainable rotation schemes by much. However, it is not correct to compare the cost of different crop rotations; their cost should be rather compared with the cost of monoculture. Compared with the latter type of soil management, almost any crop rotation may be regarded as a SSM practice in terms of its benefit to ecosystem services and evidently lower fertilizer use.

Some SSM practices, especially those related to reduced tillage, are currently widely advertised to be both sustainable and profitable in any temporal scale, leading to “win-win” results: they are believed to be less expensive, favoring higher productivity, and protecting soils from erosion and organic carbon loss, while improving the pore continuity and soil strength. Lighter but highly sophisticated tools are the necessary approaches for a sustainable soil management on the long run – even considering the climate change effects. Generally, the equipment required for the no-till or minimal tillage techniques may be even less expensive than conventional agricultural machinery. Recognizing the positive effect of these practices at least in some environments, we should still stress that their use still requires deep scientific analysis. The results of application of minimal tillage approaches need to be carefully studied under different biophysical and economic conditions and over time. Also, one should consider that the use of innovative practices in all cases requires the acquisition of special machinery, the cost of which should be taken into account in the overall economic calculation.

There are some practices that require significant investment at the first stage, but the benefit from the initial investment continues for decades. For example, terracing is an expensive practice, but it leads to a long-term reduction of water erosion, increased water-use efficiency, and facilitate machinery use. When long-term planning horizon is applied, the cost divided by the number of years is commonly inferior to the benefits obtained due to this practice, because no specific additional input is needed during the decades after terracing. However, the cost and benefit of such practices mat vary in a broad range depending on the available machinery, infrastructure and geology and geomorphology of the slopes.

5. Cost-benefit analysis of SSM implementation

At first glance the calculation of the economic value of SSM practices seems simple: it is the difference between the monetary benefits of SSM and conventional practices. In turn, in a simplified way these benefits should be calculated as the difference between the direct use values of the agroecosystem under study and the costs of soil management. In this simplified calculation the direct use value equals the price of the yield obtained at the farm, and the cost includes that of labor, fuel, machinery and its depreciation, rent, fertilizers, pesticides, seeds, etc. SSM commonly requires the use of additional innovative equipment, and though it may be even less expensive as conventional heavy machinery, it still should be purchased by the farmers, while regular tools are supposed to be already in use. Thus, the price of SSM introduction may be compensated only in a long term and creates an important barrier for SSM implementation for small farmers. In addition, the reduced used of machinery for tillage and farm management may require an increase in the use of pesticides at additional cost. Finally, labor costs should be taken into account, because many SSM practices require more intensive and more qualified labor that should be paid extra; training of farmers and workers should be also considered.

We can potentially calculate the difference in cost between SSM and conventional farming for all the individual practices listed in Table 1. However, several complications exist for the cost-benefit analysis of these practices, namely:

1. The economic parameters of each of the practices vary widely between countries and even regions depending on the crops, varieties, climatic and soil conditions, local/regional/national prices for the agricultural products and the cost of supplies, etc.
2. Each of the practices has numerous modifications due to historical traditions, as well as technical and economic facilities of each farm that may significantly modify the cost of application of these practices.
3. The list of possible practices is not complete and has to be tested against the definition of SSM.

Thus, cost-benefit analysis of SSM implementation can be easily done for an individual farm, if all the data is available, but their scaling to a national and regional level is challenging. Any universal calculation is hardly possible.

6. Benefits of ecosystem services: may/should they be included?

Soil-related ecosystem services are not limited to the production of food, feed and fiber for humans. Several other services are also of major importance, the most significant of which include organic carbon storage, biodiversity maintenance, and water regime and quality regulation. Recent studies allow the assessment of the cost even of such non-market services as biological diversity (Robinson et al. 2009), implying that TEV for the benefits of SSM can be potentially assessed.

There are two main obstacles for the inclusion of multiple complimentary ecosystem services in the cost-benefit analysis of SSM. Firstly, the abovementioned soil-related ecosystem services have a big range of variation depending on the approach to cost assessment. The only universally established method exists for soil carbon accumulation cost, which is calculated on the basis of greenhouse gas emission prices on world stock-markets. Good progress was made for erosion cost estimation based on the loss of nutrients that is proportional to soil loss amount. For biodiversity and water filtering, multiple approaches exist. Secondly, farmers have little interest in the benefits of their management practices for ecosystem services until these benefits have an economic effect for themselves. It does not mean that farmers are indifferent to public benefits, but they are not ready to pay for them out of their pocket. The inclusion of complimentary ecosystem services in the calculation would be possible only if their cost would be compensated to farmers by the authorities.

7. Conclusion

Economic assessment of SSM implementation is possible, but difficult and implies certain conventions. Since SSM has economic, technical and cultural barriers, we should assume in the analysis that certain policies for SSM implementation exist at the national and regional levels, and that bank loans and technological solutions are easily available to farmers.

The economic benefit of SSM implementation should be calculated in the simplest way as the mere difference between the cost and benefit of management practices applies. This analysis should take into account which kind of SSM practice is more suitable for each region. A database should be developed of SSM management practices and the associated economic effect of each management practice. The assessment would be valid only if based on a regional basis taking into account the biophysical conditions of each region, historical traditions and current socioeconomic conditions, which strongly affect the applicability and cost of SSM practices. Since the outputs of SSM widely range depending on multiple factors, the recommendations for the use of these practices should have a probabilistic character: the farmer would see the upper and lower limit of benefits received by other agriculturalists compared with the invested costs. Science is expected to provide as much factor-related information as possible to guide the farmers and/or local governments on the suitability of management for different climatic conditions, soils, crops and varieties. Only a framework assessment of economic benefits of SSM is possible, while the major part of the work should be done at the regional level.

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