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PROGRESS REPORT ON THE IMPLEMENTATION OF THE INTERNATIONAL INITIATIVE FOR THE CONSERVATION AND SUSTAINABLE USE OF SOIL BIODIVERSITY

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the second meeting of the Subsidiary Body on Implementation, the report prepared by the Food and Agriculture Organization of the United Nations (FAO). This report summarizes progress and main achievements on soil related work at FAO.

2. FAO prepared the present report in response to decision X/34, paragraph 11, in which the Conference of the Parties to the Convention on Biological Diversity invited FAO to provide an expanded progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity.

3. The report presents further information and guidelines to support the note by the Executive Secretary on cooperation with other conventions, international organizations and partnerships (CBD/SBI/2/10).

4. The report is presented in the form and language in which it was received by the Secretariat.

^{* &}lt;u>CBD/SBI/2/1</u>.

I. INTRODUCTION

5. The Food and Agriculture Organization of the United Nations (FAO) prepared this report in response to decision X/34, paragraph 11 in which the Conference of the Parties (COP) to the Convention on Biological Diversity invited FAO to provide an expanded progress report on the implementation of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity.

6. Since 2010, significant progress has been made in terms of soil conservation and sustainable use. The outcome document of the United Nations Conference on Sustainable Development held in Rio de Janeiro, Brazil in 2012, "The Future We Want", recognizes the economic and social significance of good land management, including soil, and its contribution to many aspects, such as economic growth, biodiversity conservation, sustainable agriculture and food security, poverty eradication, climate change mitigation and adaptation, and water availability.

7. Later on, in 2015, the 2030 Agenda and its ambitious 17 Sustainable Development Goals (SDGs) was adopted by the 193 member states of the United Nations, succeeding the Millennium Development Goals. FAO is the custodian UN agency for 21 indicators of the SDGs, cutting across SDGs 2, 5, 6, 12, 14 and 15, and it is a contributing agency to four other SDG indicators. FAO has a strong comparative advantage in its capacity to assist countries in meeting the monitoring challenge posed by the SDGs. Activities are under way for country-level collaboration in the development of indicators for land; land degradation; soils; drought; sustainable forests and mountains; sustainable land management; water efficiency and scarcity; women's access to land ownership; food losses and waste; and others.1

8. The SDGs also identify the need to restore degraded soils and improve soil health, among others. There is widespread agreement that we must nurture and unlock the full potential of soils, which not only support food production but also store and supply clean water, maintain biodiversity, sequester carbon and increase resilience in a changing climate. This is a goal that requires a universal implementation of sustainable soil management.

9. One of the pillars supporting this progress on soil conservation and sustainable use was the review of the FAO Strategic Framework 2010-2019. The revised FAO Strategic Framework aims to achieve the common vision of a world free from hunger and malnutrition, where food security and agriculture contribute to improving the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner. FAO has a key role to play on this common vision, which is achievable and aligned with the SDGs. Both are geared toward tackling the root causes of poverty and hunger, building a fairer society and leaving no one behind.

10. One of the outcomes of the reviewed FAO Strategic Framework 2010-1019 was the identification of a set of cross-cutting Strategic Objectives, closely aligned with the most relevant and urgent development problems faced by member countries and the development community:<u>2</u>

Strategic Objective 1: Contribute to eradication on hunger, food insecurity and malnutrition

Strategic Objective 2: Make agriculture, forestry and fisheries more productive and sustainable

Strategic Objective 3: Reduce rural poverty

Strategic Objective 4: Enable inclusive and efficient agricultural and food systems

Strategic Objective 5: Increase the resilience of livelihoods to threats and crises

Strategic Objective 6: Technical quality, statistics and cross-cutting themes (climate change, gender, governance and nutrition)

11. FAO has developed a common vision<u>3</u> and an integrated approach to sustainability across all agricultural sectors, which includes agriculture, forestry and fisheries. The five key principles are: 1.

<u>1</u> Food and agriculture in the 2030 Agenda for Sustainable Development <u>http://www.fao.org/sustainable-development-goals/en/</u> <u>2</u> Reviewed Strategic Framework (2017) <u>http://www.fao.org/3/a-ms431reve.pdf</u>

Improving efficiency and the use of resources; 2. Conserving, protecting and enhancing natural ecosystems; 3. Protecting and improving rural livelihoods and social well-being; 4. Enhancing the resilience of people, communities and ecosystems; 5. Promoting god governance of both natural and human systems.

12. The conservation and sustainable use of soils is at the core of FAO's mandate. FAO has been supporting countries in restoring productivity, combating land degradation and maintaining ecosystem services from land resources, among other things, by:

- Assessing the status of land resources and trends;
- Developing land resource planning tools, as well as governance and decision-support systems;
- Managing and implementing Sustainable Land Management (SLM) at the farm, landscape and national scales;
- Monitoring and assessing impacts;
- Managing knowledge to better inform decision-makers and stakeholders and to influence policymaking processes.

13. After the Global Assessment of Human-induced Soil Degradation (GLASOD) conducted from 1988 to 1991, the concept of land has been extended to include soil, biological and water resources.<u>4</u> Healthy soils are the basis to meet many global objectives, including food security, as well the production of biomass (energy), fiber, fodder, and the conservation of biodiversity as well as the provision of essential ecosystem services for human wellbeing. However, world soil resources still face pressures of various types that are reaching critical limits. Fortunately, there is recognition of the need to act in all levels to maintain healthy soils and to reverse the degradation and desertification trends.

II. FAO ACTIONS AND ACTIVITIES RELATED TO THE CONSERVATION AND SUSTAINABLE USE OF SOILS

14. The key objectives and activities of the CBD International Initiative for the Conservation and Sustainable Use of Soil Biodiversity<u>5</u> are:

Objective 1 - Sharing of knowledge and information and awareness-raising

Activities:

- Compile, synthesize, and evaluate case studies;
- Identify research gaps, work to facilitate new knowledge acquisition and dissemination;
- Create and strengthen networking arrangements with a focus on supporting local initiatives on the ground;
- Enhance public awareness, education and knowledge;
- Develop information systems and databases.

Objective 2: Capacity-building for the development and transfer of knowledge of soil biodiversity and ecosystem management into land use and soil management practices.

Activities:

- Evaluate capacity-building needs;
- Develop, apply and adapt indicators and tools for assessment and monitoring;
- Promote adaptive management approaches;
- Mobilize targeted participatory research and development;

<u>3</u> Building a common vision for sustainable food and agriculture – Principles and Approaches <u>http://www.fao.org/3/a-i3940e.pdf</u> <u>4</u> Global Assessment of Human-induced Soil Degradation (GLASOD) <u>http://www.fao.org/land-water/land/land-governance/land-resources-planning-toolbox/category/details/en/c/1036321/</u>

⁵ CBD COP Decision VIII/23, part B http://www.cbd.int/decision/cop/?id=11037

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• Identify and develop datasets on soil biodiversity at national level that are important for agriculture.

Objective 3: Strengthening collaboration among actors and institutions and mainstreaming soil biodiversity and biological management into agricultural and land management and rehabilitation programmes.

Activities:

- Mainstream soil biodiversity and ecosystem management in agricultural and land management programmes and policies;
- Develop partnerships and collaborative activities for development and implementation;
- Promote the participation of indigenous and local communities;
- Promote collaboration with respect to soil erosion and water management.

15. This session will present some of the main actions and activities implemented by FAO relevant to the conservation and sustainable use of soils. The ANNEX I presents the timeline of those activities and the ANNEX II presents the list of publications and tools.

Global Soil Partnership

16. FAO's Governing Bodies have sought to address the soil issues and mobilize all stakeholders through novel instruments and approaches. In 2012, the Global Soil Partnership (GSP)<u>6</u> was established as a mechanism to develop a strong interactive partnership and enhanced collaboration and synergy of efforts on soil between all stakeholders, from land users to policy makers. The GSP is a coalition of willing partners with the mission of improving governance of limited soil resources and ensuring healthy and productive soils for a food secure world.

17. One of the key objectives of the GSP, which is hosted by FAO in view of its global mandate, is to improve the governance and promote sustainable management of soils. The GSP Secretariat is the coordination and facilitation body in charge of facilitating the implementation of the GSP decisions and actions through its Regional Soil Partnerships and technical networks like the International Network of Soil Information Institutions (INSII), the Global Soil Laboratory Network (GLOSOLAN) and the International Network of Black Soil (INBS). The Secretariat is ultimately executing the decisions made by the representatives of GSP partners and members to FAO at the GSP Plenary Assembly, which is annually happening. This assembly is in charge of reviewing and prioritizing GSP actions, and facilitating a balanced regional decision making process. Since its establishment, the GSP has hosted six assemblies. The Sixth Plenary Assembly (PA) of the Global Soil Partnership took place from 11 to 13 June 2018 at FAO headquarters in Rome. In order to technically and scientifically advice the GSP, the First GSP Plenary Assembly established the Intergovernmental Technical Panel on Soils (ITPS) in 2013.

18. The GSP aims to promote sustainable soil management at all levels through different means including normative tools, capacity development, international events and field projects relying on evidence-based science. Up to now, the main the results of GSP, among others, are:

- Establishment of the Intergovernmental Technical Panel on Soils;
- Submission of the proposal for a UN World Soil Day (5 December) and the International Year of Soils 2015;
- Establishment of the Glinka World Soil Prize and World Soil Day Award
- Preparation of the revised World Soil Charter;
- Production of the Status of the World's Soil Resources report;

⁶ Global Soil Partnership http://www.fao.org/global-soil-partnership/en/

- Establishment of Regional Soil Partnerships;
- Development of capacities in developing countries on digital soil mapping;
- Development of Voluntary Guidelines for Sustainable Soil Management;
- Establishment of Global Soil Information System (GloSIS) relying on national capacities and national soil information systems.
- Launch of the Global Soil Organic Carbon Map (GSOCmap);
- Establishment of the Global Soil Laboratory Network (GLOSOLAN) and its Regional Soil Laboratory Networks (RESOLANs);
- Establishment of the International Network on Black Soils (INBS).

Intergovernmental Technical Panel on Soils (ITPS)

19. Also in 2013, the Intergovernmental Technical Panel on Soils (ITPS)<u>7</u> was established at the first Plenary Assembly of the Global Soil Partnership held at FAO Headquarters. The ITPS is composed of 27 top soil experts representing all the regions of the world. The main function of the ITPS is to provide scientific and technical advice and guidance on global soil issues to the Global Soil Partnership primarily and to specific requests submitted by global or regional institutions. Since then, FAO, GSP and IPTS have been working on several actions to address sustainable soil management, soil conservation and degraded land restoration in the different global agendas, including food security, climate change, desertification and biodiversity. Soil biodiversity is an important topic that needs more attention.

World Soil Day and the International Year of Soils

20. In 2013, the General Assembly of the United Nations has formally endorsed the celebration of the World Soil Day on every 5th of December and declared 2015 as the International Year of Soils (IYS) $\underline{8}$ with the objective to enhance awareness among policy makers and general public on the soil concerns.

21. One of the many fruitful results of the IYS 2015 was the first ever Global Soil Biodiversity Atlas, produced by the European Commission. The impressive Atlas raises awareness of the role of soil organisms in sustaining life on our planet and presents the latest research on soil biodiversity. It is also a major contribution from the ES target of halting the loss of biodiversity and ecosystem services by 2020 and the goals for the 2030 agenda for sustainable development on sustainable food production and fighting land degradation. The key messages from the Atlas: (i) Soil is an important habitat for thousand millions of organisms; (ii) Soil biodiversity is extremely diverse in shapes, colours, sizes and functions; (iii) Soil biodiversity is globally distributed, from deserts to polar regions through grasslands, forests, urban and agricultural areas; (iv) Soil biodiversity supports many services essential to human beings; (v) Soil biodiversity is increasingly under threat due to several pressures acting on soils; (vi) Interventions to reduce the impact of threats to soil biodiversity are available and should be widely adopted; (vii) Policies to protect and value soil biodiversity are still at an early stage and need to be further developed.

22. In 2016, FAO launched the publication "Soil and Pulses – Symbiosis for Life".<u>9</u> This publication links the International Year of Soils (2015) and the International Year of Pulses (2016)<u>10</u> by increasing awareness and understanding on the importance of soils and pluses for biodiversity conservation, ecosystem functions and services maintenance, sustainable food production, nutrition and food security. The publication brings scientific facts and technical recommendations that highlight the symbiosis

<u>7</u> Intergovernmental Technical Panel on Soils (ITPS) <u>http://www.fao.org/global-soil-partnership/intergovernmental-technical-panel-soils/en/</u>

⁸ International Year of Soils http://www.fao.org/soils-2015/en/

⁹ FAO, 2016. Soil and Pulses - Symbiosis for Life www.fao.org/3/a-i6437e.pdf

¹⁰ International Year of Pulses http://www.fao.org/pulses-2016/en/

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between soil and pulses expressed in the cropping system, which is critical to intensify food production while making better use of natural resources inputs, halting land degradation and building resilience to climate change.

Glinka World Soil Prize

23. The Glinka World Soil Prize (WSP), awarded by the GSP through the Glinka WSP selection committee, pays tribute to individuals and organizations whose leadership and activities have contributed, or still contribute, to the promotion of sustainable management and protection of soil resources. The Prize comes in the form of a Glinka gold-plated model and a USD 15.000 check. The winner is then invited at FAO HQ for the award ceremony that takes place during the World Soil Day on 5 December. The first and the second Glinka World Soil Prize were awarded respectively on the World Soil Day 2016 and 2017 to the Instituto Geografico Agustin Codazzi (IGAC) from Colombia and to Asociación Argentina de Productores en Siembra Directa (Aapresid) from Argentina.World Soil Day Award (WSDA)

24. The 6th Plenary Assembly of the GSP (June 2018) has endorsed the annual award for the most successful World Soil Day event. The award, granted during the World Soil Day celebration in Thailand, consists of a World Soil Day Medal and a prize of 15.000 USD. The award ceremony refers to the WSD celebrations of the previous year.

25. The objective of the WSDA is to encourage World Soil Day event organizers at all levels to organize and facilitate challenging and outstanding World Soil Day celebrations across the globe. It also aims at focusing the worldwide attention on the importance of healthy soils and advocating for the sustainable management of soil resources. The World Soil Day Award honors individuals, communities, organizations and countries that organize remarkable World Soil Day activities or campaigns.

Revision of the World Soil Charter (WSC)

26. In 2015, the revision of the World Soil Charter (WSC)<u>11</u> was made, under the mandate of the GSP and its scientific advisory body, the ITPS. The Charter is a policy instrument adopted by FAO Conference in 1981, and after three decades, it was revised to take into consideration the emerging and intensified issues, such as soil pollution, climate change adaptation and mitigation and urban impacts. The Charter contains a number of key principles and guidelines to major stakeholder groups. The Charter assists the prioritization of soils issue and fosters concrete actions to promote their sustainable management, conservation and restoration in cases where they are degraded or under threat.

27. Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity. Therefore, biodiversity and its ecosystem services are at the core of the revised Charter, been highlighted in both, principles and actions.

Status of the World's Soil Resources

28. Launched in 2015, the Status of the World's Soil Resources<u>12</u> was the first major global assessment on soil and related issues. We have taken soils for granted for a long time. Nevertheless, soils are the foundation of food production, nutrition and food security. Soils are the Earth's largest water filter, and they not only storage water but also a significant quantity of carbon. Soils also host a diversity of organisms that are key to the ecosystems. The assessment synthesizes the work of some 200 soil scientists from 60 countries and it shows that the majority of the conditions of world's soil resources are fair, poor or very poor. About 33% of land is moderately to highly degraded due to soil erosion, salinization, compaction, acidification, sealing, waterlogging, nutrient imbalance (both deficiency and excess), pollution, losses of soil organic carbon (SOC) and biodiversity. However, the assessment also shows evidences that this losses of soils resources and functions can be avoided. Actions are needed from individuals, private sector, governments and international organizations. Sustainable soil management

¹¹ FAO, 2015 - Revised World Soil Charter (WSC) http://www.fao.org/3/a-i4965e.pdf

¹² FAO, 2015 - Status of the World's Soil Resources www.fao.org/3/a-i5199e.pdf

(SSM) is a key concept of the assessment report: "Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity" (World Soil Charter). Therefore, SSM should be based on scientific and traditional knowledge and with the support of technologies can contribute to the conservation of soils, and subsequently, to the production of nutritious food, climate regulation and safeguarding biodiversity and ecosystem services.

29. The consideration of soil in policy formulation has been weak in most part of the world. Some reasons include lack of evidences needed for policy action; the challenge of dealing with property rights for a natural resource that is often privately owned and the same time a public good; the long-time scales involved in soil change (most important changes take place over decades and can be difficult to detect.

Land Degradation Assessment in Drylands (LADA)

30. In the same year, FAO launched the methodology and results of the Land Degradation Assessment in Drylands, the LADA project. The LADA13 programme has been financed by the Global Environment Facility (GEF), implemented by the United Nations Environment Programme (UNEP) and executed by the Food and Agriculture Organisation (FAO). It has been supported by the UNCCD and a number of international partners. LADA was a response to a worldwide shortage of information about global land degradation. LADA has pushed the boundary further, to include the degradation of the entire human environment ecosystem, including social benefits and losses. Lada is a scientifically-based approach to assessing and mapping land degradation at different spatial scales - small to large - and at various levels - local to global. It was initiated in drylands, but the methods and tools have been developed to be widely applicable in other ecosystems and diverse contexts with minimal required adaptation. LADA's main objective, using its mapping and assessment tools, is to identify and understand the causes of land degradation and the impacts of land use, including the effectiveness of current/recent responses, thereby enabling adequate and sustainable land management solutions to be devised. LADA provides a global monitoring and assessment system and an interlinked national and local level assessment and decision support system on land degradation and improvement that enables stakeholders (national multi-sectoral teams) and agencies with land users at local level to identify and prioritize required national planning and policy interventions and actions on the ground for promoting the wide adoption of sustainable land management (SLM).

31. The LADA project has produced two global products: GLADA (Global Land Degradation Assessment and Improvement) and the innovative GLADIS (Global Land Degradation Information System). GLADA uses remote sensing data to identify areas that are becoming degraded and areas where degradation has been arrested or reversed. GLADIS facilitates analysis of the change in the provision of ecosystem goods and services resulting from land management practices. The main components analysed are biomass, soil health, water quantity, biodiversity, economic benefit and social benefit.

32. In 2014, the Healthy Soils Facility Trust Fund was established as an umbrella programme, over a five-year implementation period, in response to a specific request from the Plenary Assembly of the Global Soil Partnership (GSP) at its first meeting of June 2013. Current resource partners contributing to the Facility are The European Commission, The Russian Federation, The Swiss Confederation, The Kingdom of Thailand, The International Fertilizer Industry Association, The United Nations Environment Programme (UNEP), The International Association of Agriculture Production Insurers, The Austrian Hail Insurance Company.

The Voluntary Guidelines for Sustainable Soil Management

33. The Voluntary Guidelines for Sustainable Soil Management<u>14</u>, endorsed by the FAO Council in December 2016 at its 155th Session, was developed to complement the World Soil Charter by further

<u>13</u> FAO, 2011 – Land Degradation Assessment in Drylands Methodology and result <u>www.fao.org/3/a-i3241e.pdf</u> <u>14</u> FAO, 2017 - Voluntary Guidelines for Sustainable Soil Management <u>www.fao.org/3/a-bl813e.pdf</u>

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elaborating principles and practices for incorporation into policies and decision-making. In the Voluntary Guidelines, biodiversity is one of the technical items for sustainable soil management and to address soil threats. The Voluntary Guidelines highlights the fact that soils provide one of the largest reservoirs of biodiversity on earth, and at the same time, soil biodiversity provides a full range of ecosystem services fundamental to maintain core soil functions.

34. Since their endorsement, the guidelines have been implemented by the GSP Secretariat throughout its five pillars of action. However, the recently endorsed global implementation plan for Pillar 1 on "promoting sustainable management of soil resources for soil protection, conservation and sustainable productivity" dedicates special attention to their implementation.

FAO Soils Portal

35. FAO Soils Portal<u>15</u> provides soil information and knowledge on the different components and aspects of soils and on the value and importance of this vital and finite resource for policy makers, development planners, soil scientists, agricultural extension officers, students and other practitioners.

36. The Portal has sessions that present soil definitions, publications, information on policy and governance, soil management, soil degradation and restoration. The portal has a session exclusively for soil biodiversity, which cover subjects such as soil organisms, soil conservation and agriculture, and research on soil biodiversity.

Global Soil Carbon Map

37. Soil organic carbon (SOC) is the carbon that remains in the soil after partial decomposition of any material produced by living organisms. It constitutes a key element of the global carbon cycle through atmosphere, vegetation, soil, rivers and the ocean. SOC is the main component of soil organic matter (SOM) and as such constitutes the fuel of any soil. SOM supports key soil functions as it is critical for the stabilization of soil structure, retention and release of plant nutrients, and allowing water infiltration and storage in soil. It is therefore essential to ensuring soil health, fertility and food production.

38. The loss of SOC indicates a certain degree of soil degradation. Soils represent the largest terrestrial organic carbon reservoir. Depending on local geology, climatic conditions and land use and management (amongst other environmental factors), soils hold different amounts of SOC. Unsustainable management practices such as excessive irrigation causes SOC loss and massive erosion. Loss of SOC negatively affects not only soil health and food production, but also exacerbates climate change. When SOM is decomposed, carbon-based greenhouse gases are emitted to the atmosphere. On the other hand, soils have the potential to increase their SOC stocks, thus mitigating climate change by reducing the atmospheric CO2 concentration.

39. The GSP Plenary Assembly in 2016 instructed the Intergovernmental Technical Panel on Soils (ITPS) and the GSP Secretariat to develop the first-ever country-driven Global Soil Organic Carbon map (GSOCmap)<u>16</u>. The Global Soil Organic Carbon Map (GSOCmap), a country driven endeavour, represents a key contribution to SDG indicator 15.3.1, which defines the area of degraded land. The GSOCmap represents the first ever global soil organic carbon assessment produced through a participatory approach in which countries developed their capacities and stepped up efforts to compile all the available soil information at national level.

40. The global soil carbon map consists of national SOC maps, developed as 1 km soil grids, covering a depth of 0-30 cm. In order to develop technical support, a cookbook for soil carbon mapping was produced. This cookbook is also used for workshops and e-learning. A group of experts prepared the

¹⁵ FAO Soils Portal http://www.fao.org/soils-portal

<u>16</u> Global Soil Organic Carbon Map <u>http://www.fao.org/global-soil-partnership/pillars-action/4-information-and-data/global-soil-organic-carbon-gsoc-map/en/</u>

first edition of a Soil Organic Carbon Mapping Cookbook (FAO, 2017) as a comprehensible reference knowledge source to support the development process. The second edition of the cookbook (FAO, 2018) provides generic methodologies and technical steps to produce SOC maps. This edition has been updated with knowledge and practical experiences gained during the implementation process of the previous version. The cookbook includes step-by-step guidance for the preparation of local soil data, the compilation and pre-processing of ancillary spatial data sets, upscaling methodologies, and uncertainty assessment methods.

41. GSOCmap is a consultative and participatory process involving 110 countries. The GSOCmap provides users with useful information to monitor the soil condition, identify degraded areas, set restoration targets, explore SOC sequestration potentials, support the greenhouse gas emission reporting under the UNFCCC and make evidence based decisions to mitigate and adapt to a changing climate. A precise and reliable global view on soil organic carbon (SOC) is needed under different UN conventions, such as the UN Convention on Climate Change and Desertification (UNCCD), and also part of the Sustainable Development Goals (SDG). However, the quality of soil carbon information at global level is still limited.

42. The GSOCmap provides users with very useful information to monitor the soil condition, identify degraded areas, set restoration targets, explore SOC sequestration potentials, support the greenhouse gas emission reporting under the UNFCCC and make evidence based decisions to mitigate and adapt to a changing climate.

Global Symposium on Soil Organic Carbon

43. During the 5th Working Session of the Intergovernmental Technical Panel on Soils (ITPS) of the GSP, ITPS and the Acting Secretary of the Intergovernmental Panel on Climate Change (IPCC) agreed that it would be desirable to incorporate the topic of soil organic carbon (SOC) in the IPCC Assessment Report. As a result, the ITPS and IPCC, supported by FAO, jointly organized the Global Symposium on Soil Organic Carbon (GSOC17) to discuss and elaborate the latest information on the role of soil and SOC in the climate change agenda. The United Nations Convention to Combat Desertification (UNCCD) and its Science-Policy Interface (SPI), and the World Meteorological Organization (WMO) agreed to co-sponsor GSOC17 in light of the important contribution that maintaining and enhancing SOC can make to meeting the objectives of land degradation neutrality, reducing GHG emissions, and enhancing climate change adaptation.

44. The Global Symposium on Soil Organic Carbon<u>17</u> took place from 21 to 23 March 2017 at the FAO headquarters and focused on the role of soils and soil organic carbon (SOC) in the climate system. This high-level international scientific meeting aimed to enable and strengthen the provision of knowledge on SOC measurement, modeling and management while identifying promising research, policies, and action plans for maximizing the potential of soil carbon sequestration for climate change adaptation/ mitigation. The Symposium was a scientific meeting with over 400 participants representing all regions of the world. The three main themes were measuring, mapping, monitoring and reporting SOC; maintaining and/or increasing SOC stocks (fostering SOC sequestration) for climate change mitigation and adaptation, and Land Degradation Neutrality; managing SOC in soils with high SOC (peatlands, permafrost, and black soil), as well as grasslands, livestock production systems and dryland soils. Abstracts and papers for key topics were invited to support the above themes and incorporate case studies from different countries. Guidelines for the preparation of abstracts and papers were provided.

45. The overall aim of the symposium was to review the role of soils and SOC in the context of climate change, sustainable development and land degradation neutrality (LDN). The three-day symposium was structured around three main themes focusing on the assessment of SOC, the maintenance and increase of SOC stocks, and SOC management in specific types of soil.

¹⁷ Global Symposium on Soil Organic Carbon - http://www.fao.org/about/meetings/soil-organic-carbon-symposium/en/

46. The symposium outcome is a scientific document highlighting the role of soils and SOC management in meeting the climate change and sustainable development agendas that could be assessed by IPCC in its regular reports, starting with SR2, the refinement of the inventory guidelines, and AR6, as well as reporting to UNFCCC, UNCCD and the SDGs. The recommendations presented in the outcome document 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 recommendations are structured around three main themes focusing on the assessment of SOC, the maintenance and increase of SOC stocks, and SOC management in specific types of soil.

Recommendation 1: Organize capacity development and training for countries to develop national reference values for SOC stocks, as well as the necessary data management capacities and facilities.

Recommendation 2: Establish a working group 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.

Recommendation 3: In estimates of the potential for SOC sequestration, include the full GHG balance and consider possible interactions between the carbon and nitrogen cycles that could affect the climate change mitigation potential of applied practices.

Recommendation 4: The design of implementation strategies and appropriate soil and land management practices for SOC protection and sequestration should consider land use and the local environmental, socio-economic, cultural and institutional contexts, and potential barriers to adoption.

Recommendation 5: Identify and specify the tangible short-term and long-term benefits for farmers of management practices for SOC sequestration to trigger their adoption, and introduce mechanisms to incentivize the adoption of such practices.

Recommendation 6: Prevent SOC losses by maintaining current SOC stocks (especially in carbon-rich soils) as the minimum action on SOC management.

Recommendation 7: Prioritize soils with the highest carbon stocks in the development of national and regional policies on soil conservation to prevent SOC losses.

Recommendation 8: Support land-users sufficiently to implement and sustain appropriate soil and land management practices to protect and enhance SOC under local conditions for long-term benefit.

Global assessment on the impact of plant protection products (PPP) on soil functions and soil ecosystems

47. The GSP at its 2016 plenary session requested that the ITPS to complete "an assessment at global level of the impact of Plant Protection Products on soil functions and soil ecosystems". The global assessment on the impact of PPP on soil functions and soil ecosystem<u>18</u> only took into consideration the PPP that have contact with soil and their impacts on soil biodiversity, soil functions, water quality and soil erosion. The scientific studies have consistently found measurable and statistically significant effects of PPP on soil microorganisms. The effects lead to both significant decreases and significant increases in attributes of soil organisms such as biomass, enzyme activity, respiration and species composition. There is limited evidence on the effects of PPP on soil organisms that have led to significant decreases in soil functions, and this is a major limitation of the current knowledge available.

48. There is more evidence from harmful effects of PPP on earthworms, specifically the negative effects of cooper-based fungicides and recent evidences of the toxicity of neonicotinoids.

Global Symposium on Soil Pollution

49. FAO, GSP and ITPS, together with the Secretariats of the Basel, Rotterdam and Stockholm Conventions, UN Environment and World Health Organization (WHO), agreed to explore the option of a

<u>18</u> Global assessment on the impact of plant protection products (PPP) on soil functions and soil ecosystems <u>http://www.fao.org/3/i8168en/I8168EN.pdf</u>

jointly organized Global Symposium on Soil Pollution as a common platform to discuss and elaborate the latest information on the status, trends and actions (both scientific and political) on soil pollution and its consequences on human health, food safety and the environment. The Global Symposium on Soil Pollution (GSOP18) took place at FAO headquarters from 2 to 4 May 2018. The symposium was the first step in implementing the Voluntary Guidelines for Sustainable Soil Management in terms of preventing and reducing harmful substances in soil as a way to maintain healthy soils and food safety in accordance with the Sustainable Development Goals. Specifically, the symposium outcomes will provide scientific evidence to support actions and decisions to prevent and reduce soil pollution for increased food security and nutrition, and ecosystem services, and promote the remediation of polluted sites.

50. The specific objectives of the symposium:

- Examine the current scientific and technical understanding of soil pollution and its effects on food production and safety;
- Critically reflect on the impact of land use decisions at the national level (e.g. related to mining, and intensive agriculture and livestock production) on soil pollution and eventually, air and water where polluted soil or its pollutants can be transported by erosion processes or water runoff;
- Identify limitations and prioritize key challenges related to restoring polluted sites;
- Review existing international policies, agreements and frameworks addressing sources of pollution to agricultural land in order to assess their effectiveness and propose ways to improve them; and
- Survey and review the use of soil thresholds for pollutants globally and explore additional research and policy needs.

51. The expected outcome of the symposium is the document "Be the solution to soil pollution", which will highlight the importance of addressing soil pollution from the food safety, environment and human health perspectives and will include a joint agenda for action based on scientific evidence to prevent it, mitigate it and remediate it where feasible.

III. SOIL BIODIVERSITY

52. Soils host a tremendous diversity of organisms that play fundamental roles in driving many ecological services on which the functioning of terrestrial ecosystem depend on, including soil formation, nutrient and water cycling, climate regulation, production of food, medicine and fibre, disease and pest control.

53. The biodiversity of soil is immense compared to aboveground biodiversity, although most of this diversity remains unknown. Molecular technologies progress is helping to open the "black box" of soil biodiversity. Soil biodiversity represent an important biological and genetic resource for biotechnological exploitation. The contribution of soil biota to human health is considerable: nearly 80% of antibacterial agents approved between 1983 and 1994 have their origin in the soil.19

54. Soil biodiversity is vulnerable to many human disturbances, including land use, climate change, nitrogen enrichment, soil contamination, invasive species, and sealing of soil. Studies revealed that increasing land use intensity and associated organic matter loss are placing the greatest pressure on soil biodiversity, and soil biodiversity declines as result of the conversion of natural lands to agriculture and from agricultural intensification. The large-scale use of pesticides may have direct or indirect effects on soil biodiversity, but the lack of data results on contradictory research results.

55. Although the enormous scientific progress made, the protection and monitoring of soil resources at the national to global levels face complex challenges restricting the design and implementation of onthe-ground policies. There is insufficient global support for meeting these challenges, which vary widely by region, and therefore for the protection and sustainable management of the world's soil resources. Regional and global assessment on the main threats and the current status of soil biodiversity could help

¹⁹ FAO, 2015 - Status of the World's Soil Resources www.fao.org/3/a-i5199e.pdf

to close the knowledge gaps and inform stakeholders on the consequence of their actions on land use, climate change, biodiversity and ecosystem services.

IV. CONCLUSION

56. Soil have become one of the world's most vulnerable resources in the face of climate change, land degradation, biodiversity loss and increased demand for food production. Soil biodiversity is a key determinant of land productivity. Improved management of soil biodiversity in agro-ecosystems offers solutions for sustainable farming, whilst increasing carbon storage, reducing off-farm pollution and improving water cycling. Indeed, soil is increasingly recognized as playing a fundamental role in the quality and availability of our water supply. Also, it plays an important role in supporting animal biodiversity above ground, including wildlife and domesticated livestock. Therefore, soil biodiversity underpins a multitude of ecosystems functions and services which deliver benefits to human being and nature, sustaining food systems and benefiting ecosystems beyond agro-systems.

57. Losses in ecosystem services required for crop production have been partly compensated by applying more external inputs, which increases farming footprint on the broader ecosystem. Concerns regarding resource depletion prompt us to seek models that shift efforts towards more sustainable intensification. Practices that have a beneficial effect on soil biodiversity, such as restoration of soil ecosystem services or soil management (that minimize SOC loss or increase SOC levels) are opportunities to address the alarming state and trend in degradation of agricultural soils worldwide.

58. The underground biological diversity formed by worms, bacteria, virus, fungi, mites, insects, and vertebrates are almost invisible. However, they are responsible for many of the ecosystems functions and services essential for life. Technological advances like molecular technologies are helping to overcome previous methodological challenges in characterizing soil biodiversity. Closing these knowledge gaps is fundamental to inform police makers about the consequences of unsustainable land use, pesticides, desertification or climate change on both biodiversity and soil ecosystem services. Alongside new developments with respect to assessing biodiversity, it is essential to link biodiversity measures with specific soil functions in order to understand the pivotal roles of soil organisms in mediating soil services.

59. Soil is one clear intersection between the Rio Conventions (CBD, UNCCD, UNFCCC), The Basel, Rotterdam, Stockholm Conventions, and many other global and multi-lateral environment agreements. And sustaining or restoring soil functions and heath is a cross-cutting approach to achieve many of those global objectives. Soils bring an opportunity to align these agreements and strength implementation of existing agreements and frameworks.

60. It is time to build a stronger commitment to close the gaps on knowledge, to revise the plan of action with the most recent findings, and to provide further support to countries on the implementation of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity in partnership with important stakeholders such as the Global Soil Partnership, the ITTPS, the Global Soil Biodiversity Initiative, academic and research institutes, donors agencies, private sector, as well as relevant organizations, land owners and land managers, farmers, Indigenous Peoples and Local Communities and civil society. This commitment will support not only the achievement of the FAO strategic Framework objectives as well as the Aichi Targets and SDGs, but also can support the post-2020 biodiversity framework and the 2050 Vision for Biodiversity.

ANNEX I - TIMELINE – PROGRESS AND MAIN ACHIEVEMENTS ON SOIL RELATED WORK AT FAO

2012	Formal establishment of the Global Soil Partnership (GSP)
2013	First panel of the Intergovernmental Technical Panel on Soils (ITPS) First Plenary Assembly (PA) of the Global Soil Partnership
	Endorsement by the UN General Assembly of the two important new celebrations: International Year of Soils 2015 (IYS) and World Soil Day, 5th December (WSD)
2014	Launch of the Healthy Soils Facility Trust Fund Second Plenary Assembly (PA) of the Global Soil Partnership 9 regional soil partnerships created Launch of the FAO soils portal World Soil Day 2014
2015	Second panel of the Intergovernmental Technical Panel on Soils (ITPS) International Year of Soils 2015 Release of the Revised Soil Charter 4 targets of the 17 Sustainable Development Goals specifically related to soils Release of the Status of the World's Soil Resources Establishment of the International Network of Soil Information Institutions (INSII) Third Plenary Assembly (PA) of the Global Soil Partnership World Soil Day 2015
2016	Launch of the Online consultation for developing the Voluntary Guidelines for Sustainable Soil Management 'Zero draft' Forth Plenary Assembly (PA) of the Global Soil Partnership World Soil Day 2016
2017	Global Symposium on Soil Organic Carbon (GSOC17) Fifth Plenary Assembly (PA) of the Global Soil Partnership Launch of the International Network of Black Soils (INBS) Selection of the GSP Soil Data Facility Release of the Voluntary Guidelines for Sustainable Soil Management Launch of the Global Soil Laboratory Network (GLOSOLAN) Launch of the Global Soil Organic Carbon Map (GSOCmap) World Soil Day 2017
2018	Global Symposium on Soil Pollution (GSOP18) Third panel of the Intergovernmental Technical Panel on Soils (ITPS) Online consultation for developing the Code of Conduct for the Management of Fertilizers Sixth Plenary Assembly (PA) of the Global Soil Partnership

ANNEX II - TOOLS AND KEY PUBLICATIONS

- 2010 Challenges and Opportunities for Carbon Sequestration in Grassland Systems (2010)
- **2012** Soil carbon monitoring using surveys and modelling (2012)
- 2013 Lada Project Land degradation assessment in drylands -
- 2013 State of the Art Report on Global and Regional Soil Information (2013)
- 2014 Soils Challenge Badge | Yunga Booklet (2014)
- 2014 World reference base for soil resources 2014
- 2014 World reference base for soil resources 2014. International soil classification system for naming soils and creating legends for soil maps
- 2015 Farmer's Compost Handbook (2015)
- 2015 Testing Field Methods for Assessing the Forest Protective Function for Soil and Water
- 2015 Field Guide for Rapid Assessment of Forest Protective Function for Soil and Water
- 2015 Understanding Mountain Soils: A Contribution from mountain areas to the International Year of Soils 2015
- 2015 Revised World Soil Charter (2015)
- 2015 Status of the World's Soil Resources
- 2016 Soil and Pulses, Symbiosis for Life
- 2017 Soils' Potential to Contribute to Offset International Aviation Emissions
- 2017 GSP Soil Data Policy
- 2017 Global Soil Carbon Map
- 2017 Voluntary Guidelines for Sustainable Soil
- 2017 Global assessment of the impact of plant protection products on soil functions and soil ecosystems
- 2017 Soil Experiments for Children
- 2017 Proceedings of the Global Symposium on Soil Organic Carbon 2017
- 2017 Soil Organic Carbon The Hidden Potential
- 2018 Soil Pollution Symposium
- 2018 Handbook for Saline Soil Management
- 2018 Soil Organic Carbon Mapping Cookbook 2nd Edition