UN environment programme

CBD

Convention on Biological Diversity

Distr.
GENERAL

CBD/SBSTTA/REC/24/6
27 March 2022

ORIGINAL: ENGLISH

SUBSIDIARY BODY ON SCIENTIFIC,
TECHNICAL AND TECHNOLOGICAL ADVICE
Twenty-fourth meeting
Online, 3 May – 9 June 2021
Geneva, Switzerland, 14-29 March 2022
Agenda item 7

RECOMMENDATION ADOPTED BY THE SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE

24/6. Review of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity and updated plan of action

The Subsidiary Body on Scientific, Technical and Technological Advice,

Having considered the note by the Executive Secretary,[1]

1. *Welcomes* the draft plan of action 2020-2030 for the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity, as contained in the annex to the present recommendation;

2. [*Takes note* of] [*Also welcomes*] the report entitled *State of Knowledge on Soil Biodiversity - Status, Challenges and Potentialities*,[2] prepared by the Food and Agriculture Organization of the United Nations in collaboration with the Intergovernmental Technical Panel on Soils of the Global Soil Partnership, the Global Soil Biodiversity Initiative, the European Commission and the Secretariat of the Convention on Biological Diversity, and its summary for policymakers;

3. *Also takes note* of the outcomes of the 2021 Global Symposium on Soil Biodiversity, jointly organized by the Food and Agriculture Organization of the United Nations and its Global Soil Partnership, and the Intergovernmental Technical Panel on Soils, together with the Secretariat of the Convention on Biological Diversity, the Global Soil Biodiversity Initiative and the Science-Policy Interface of the United Nations Convention to Combat Desertification;

4. *Recommends* that the Conference of the Parties at its fifteenth meeting adopt a decision along the following lines:

The Conference of the Parties,

Recalling decisions III/11, V/5, VI/5, VIII/23 and X/34,

Acknowledging the importance of soil biodiversity in underpinning the functioning of terrestrial ecosystems and, therefore, most of the services it delivers,

Recognizing that activities to promote the conservation, restoration and sustainable use of soil biodiversity, and the ecosystem functions and services they provide, are key in the functioning of sustainable agricultural systems for food and nutrition security for all, for climate change

[1] CBD/SBSTTA/24/7/Rev.1.

[2] CBD/SBSTTA/24/INF/8.

[mitigation and] adaptation, the transition towards more sustainable agricultural [and food] systems and to enhance the achievement of the Sustainable Development Goals,

[1. *Adopts* the plan of action 2020-2030 for the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity, as contained in the annex to the present decision, and considers it an instrument for supporting the implementation of the post-2020 global biodiversity framework on a voluntary basis and in accordance with national circumstances and priorities;]

2. *[Takes note* of] [*Welcomes*] the report entitled *State of Knowledge on Soil Biodiversity - Status, Challenges and Potentialities*,[2] prepared by the Food and Agriculture Organization of the United Nations in collaboration with the Intergovernmental Technical Panel on Soils of the Global Soil Partnership, the Global Soil Biodiversity Initiative, the European Commission and the Secretariat of the Convention on Biological Diversity;

3. *Encourages* Parties, other Governments and relevant organizations to support the implementation of, and capacity-building and development for, the plan of action 2020-2030 for the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity through, among other things, the integration of appropriate measures into national biodiversity strategies and action plans and national reports, sustainable soil management and relevant agricultural policies, plans, legislation, standards, programmes and practices, in accordance with national priorities and circumstances;

[4. *Urges* Parties to address the [direct and indirect] drivers of soil biodiversity loss and land degradation [, including land-use change, and to identify, phase out and eliminate incentives, taxes and subsidies harmful to soil biodiversity];]

5. *Encourages* Parties to integrate the conservation, restoration and sustainable use of soil biodiversity into agricultural systems [and other managed ecosystems] [and other sectors identified by previous decisions of the Conference of the Parties], land and soil management, development programmes and relevant policies [at all levels, including incentives, and other measures, such as taxes and subsidies, to promote sustainable soil management];

6. *Invites* academic and research bodies, relevant organizations, networks and indigenous peoples and local communities, [farmers,] women and youth, to increase knowledge and promote awareness-raising activities on the importance of soil biodiversity and to promote further research in order to address gaps identified in the plan of action[, including through North-South technology transfer and capacity-building];

7. *Invites* the Food and Agriculture Organization of the United Nations, including through the framework of the Global Soil Partnership, to facilitate the implementation of the plan of action, involving Parties, including their ministries of agriculture and environment at the national level, as appropriate;

8. *Invites* the United Nations Environment Programme, the Food and Agriculture Organization of the United Nations, the United Nations Convention to Combat Desertification, the Intergovernmental Technical Panel on Soils of the Global Soil Partnership and the Global Initiative for Soil Biodiversity to support the implementation of the post-2020 global biodiversity framework with regard to soil-related targets and actions, including their monitoring and reporting;

9. *Urges* [developed country Parties] [Parties] and invites other Governments and organizations [in a position to do so,] to provide technical and financial support, as appropriate, to enable developing country Parties and Parties with economies in transition to promote the research, technology transfer, monitoring and assessment of soil biodiversity [, consistent with Article 20 of the Convention];

10. *Invites* the Global Environment Facility, other donors, funding agencies and the private sector to provide financial assistance, including capacity-building and development activities, for national, subnational and regional projects, in particular for developing countries and countries with economies in transition, that address the implementation of the plan of action for the conservation and sustainable use of soil biodiversity;[3]

11. *Invites* Parties to provide, on a voluntary basis, information on their activities and results from the implementation of the plan of action, in alignment with the post-2020 global biodiversity framework, as appropriate, and requests the Executive Secretary to compile the submissions and to make them available for consideration by the Subsidiary Body on Scientific, Technical and Technological Advice at a meeting held prior to the seventeenth meeting of the Conference of the Parties;

12. *Requests* the Executive Secretary to bring the present decision to the attention of the Food and Agriculture Organization of the United Nations, the United Nations Convention to Combat Desertification, the United Nations Framework Convention on Climate Change, other United Nations organizations, programmes and biodiversity-related conventions and the United Nations Decade on Ecosystem Restoration (2021-2030).[4]

Annex

DRAFT PLAN OF ACTION 2020-2030 FOR THE INTERNATIONAL INITIATIVE FOR THE CONSERVATION AND SUSTAINABLE USE OF SOIL BIODIVERSITY

I. INTRODUCTION

1. Since the launch of the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity, a significant amount of new scientific, technical and other types of knowledge relevant to soils and their biodiversity has been released.

2. The plan of action 2020-2030 for the International Initiative for the Conservation and Sustainable Use of Soil Biodiversity is based on the review of the Initiative, the *Status of the World's Soil Resources* report[5] and on the findings of the report on the *State of Knowledge on Soil Biodiversity - Status, Challenges and Potentialities*,[6] prepared by the Food and Agriculture Organization of the United Nations (FAO) and the Intergovernmental Technical Panel on Soils.

3. Improved management of soil and its biodiversity offers solutions for all sectors that rely on soils, including forestry and farming, [as well as natural areas,] while it can simultaneously increase carbon storage, improve water and nutrient cycling, resilience to climate change, [while preventing and avoiding potential impacts arising from the implementation of soil mitigation approaches and practices on indigenous peoples and local communities] [including through nature-based solutions,[7]] [including through ecosystem approaches] and mitigate pollution. Soil biodiversity depends on the type of climate, mineral soil and type of vegetation and, in turn, this biodiversity has an effect on soil. In order to maintain or restore the biodiversity of soils, it is necessary to maintain or restore their biophysical, biochemical and biological

[3] This paragraph, which addresses support from the Global Environment Facility, will eventually be reflected in a decision on the financial mechanism which will consolidate the guidance of the Conference of the Parties to the Global Environment Facility.

[4] See General Assembly resolution 73/284 of 1 March 2019.

[5] Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils (2015). *Status of the World's Soil Resources* – Main Report, Rome.

[6] CBD/SBSTTA/24/INF/8.

[[7] At its fifth session, the United Nations Environment Assembly, in its resolution on "Nature-based solutions for supporting sustainable development", formally adopted the definition of nature-based solutions as being "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits."]

properties. Soil biodiversity and its biotic interactions are important levers to improve soil quality and function, highlighting the importance of research, monitoring and management that is geared directly at soil biodiversity, as an integrative part and key element of soil quality. Soil biodiversity is also crucial to improve not only soil health,[8] but also plant, animal and human health.

4. However, soil is one of the world's most vulnerable resources in the face of pollution, climate change, desertification, land degradation, drought, land-use change, unsustainable agriculture practices, biodiversity loss, increased demand for water and food production, urbanization and industrial development. Therefore, in order to safeguard soils and ecosystems, it is necessary to prevent the loss of soil and soil biodiversity from anthropogenic drivers related to climate change, such as the increase in temperature, droughts or extreme rainfall, and to land-use change, [such as fires, agricultural burning crop monoculture, improper and overuse of agrochemicals, soil pollution, soil sealing, soil compaction, soil salinization, intensive tillage, deforestation and introduction of invasive alien species].

5. The present plan of action presents global actions to support the integration of soil biodiversity considerations into the context of the post-2020 global biodiversity framework, as well as within and across productive sectors.

6. The elements of this plan of action recognize the need to mainstream soil biodiversity across sectors and the need for integrated approaches to better address the complex interactions that come into play as the conservation and sustainable use of soil biodiversity usually involve economic, environmental, cultural and social factors. The importance of implementation at the field level with due consideration of gender roles, local context and specificities is another element reflected in the plan, while awareness-raising, sharing of knowledge, capacity-building and research remain key to ensuring a better understanding of the role of soil biodiversity for sustainability.

7. The present plan of action has been prepared jointly by FAO, the Secretariat of the Global Soil Partnership (GSP) and the Secretariat of the Convention on Biological Diversity, in consultation with other partners and relevant experts, pursuant to decision 14/30.

II. PURPOSE AND OBJECTIVES

8. The *Status of the World's Soil Resources* report identified 10 threats critical to soil functions. The loss of soil biodiversity was identified as one of these threats, and a respective call for action was strongly recommended. The Voluntary Guidelines for Sustainable Soil Management[9] provide a framework for reverting it through a number of policies, research and field actions.

9. The *purpose* of this plan of action is to provide ways to encourage conservation, restoration and sustainable use of soil biodiversity and to support Parties, other Governments, subnational and local governments, indigenous peoples and local communities, women and youth, relevant organizations and initiatives, in accelerating and upscaling efforts towards the conservation, restoration and sustainable use of soil biodiversity, and towards the assessment and monitoring at the corresponding level of soil organisms to promote their conservation, sustainable use and/or restoration, and to respond to challenges that threaten soil biodiversity.

10. The *overall objective* of this plan of action is to mainstream soil biodiversity science, knowledge, and understanding into public policies, at all levels, and to foster coordinated action to invest in soil biodiversity assessments at the global level to safeguard and promote the conservation, restoration and sustainable use of soil biodiversity and its ecosystem functions and services, which are essential for

[8] Soil health is defined as: "The capacity of soil to function as a living system. Healthy soils maintain a diverse community of soil organisms that help to control plant disease, insect and weed pests, form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive repercussions for soil water and nutrient holding capacity, and ultimately improve crop production". FAO. 2011. *Save and Grow: A Policymaker's Guide to the Sustainable Intensification of Smallholder Crop Production*. ISBN 978-92-5-106871-7112. http://www.fao.org/3/i2215e/i2215e00.htm

[9] FAO 2017. *Voluntary Guidelines for Sustainable Soil Management*. Food and Agriculture Organization of the United Nations, Rome. http://www.fao.org/documents/card/en/c/5544358d-f11f-4e9f-90ef-a37c3bf52db7/.

sustaining life on Earth, while acknowledging that economic, environmental, cultural and social factors contribute to sustainable soil management, and to promote investment in soil biodiversity research, monitoring and assessment at the corresponding level. Achieving this objective will ensure that soil biodiversity recovers and continues to provide a full range of functions. It will also formally promote sustainable soil management practices, including artisanal forms of food production, which can enhance soil biodiversity while maintaining the productivity of managed ecosystems.

11. The *specific objectives* of this plan of action are to help Parties, other Governments, indigenous peoples and local communities, women and youth, and other stakeholders, in accordance with national priorities and circumstances, consistent with the Convention and other applicable international obligations, as well as relevant organizations and initiatives, with the following:

(a) Implementing coherent and comprehensive policies for the conservation, restoration and sustainable use of soil biodiversity at the local, subnational, national, regional and global levels, considering the different economic, environmental, cultural and social factors of all relevant productive sectors and their soil management practices, and mainstreaming their integration into relevant sectoral and cross-sectoral plans, programmes and strategies;

(b) Encouraging the use of sustainable soil management practices and existing tools, sustainable traditional practices, guidance and frameworks to maintain and restore soil biodiversity and to encourage the transfer of knowledge and enable women, particularly rural women, indigenous peoples and local communities and all stakeholders to harness the benefits of soil biodiversity for their livelihoods, taking into account national circumstances;

(c) Promoting education, awareness-raising and developing capacities in the public and private sectors on the multiple benefits and application of soil biodiversity, sharing knowledge and improving the tools for decision-making, fostering engagement through collaboration, intergenerational transmission of traditional knowledge of indigenous peoples and local communities and partnerships, and providing practical and feasible actions to avoid, reduce or reverse soil biodiversity loss;

(d) Developing voluntary standard protocols to assess the status and trends of soil biodiversity, as well as monitor activities, in accordance with national legislation, to address gaps in knowledge and foster relevant research, and to enable compilation of large data sets to support research and monitoring activities;

(e) Recognizing and supporting the role, and land and resource rights of indigenous peoples and local communities, in accordance with national legislation and international instruments, as well as the role of women, smallholders and small-scale food producers, particularly family farmers, in maintaining biodiversity through sustainable agricultural practices,[[such as agroecology and ecological intensification] [such as sustainable agricultural practices as identified by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services] [such as agroecology and sustainable intensification approaches]].

12. The plan of action seeks to contribute to the achievement of the Sustainable Development Goals, in particular Goals 2, 3, 6, 13, 14 and 15, the post-2020 global biodiversity framework, the 2050 Vision for Biodiversity, the FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors,[10] the 2018-2030 Strategic Framework under the United Nations Convention to Combat Desertification (UNCCD)[11] and the objectives, commitments and initiatives under other conventions and multilateral environmental agreements, including the three Rio conventions, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal,[12] the Rotterdam Convention on the Prior Informed Consent Procedure

[10] FAO. 2020. *FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors*. Rome. https://doi.org/10.4060/ca7722en.

[11] United Nations Convention to Combat Desertification, Conference of the Parties, thirteenth session, decision 7/COP.13 (see ICCD/COP(13)/21/Add.1).

[12] United Nations, *Treaty Series*, vol. 1673, No. 28911.

for Certain Hazardous Chemicals and Pesticides in International Trade[13] and the Stockholm Convention on Persistent Organic Pollutants,[14] and the Minamata Convention on Mercury.

III. SCOPE AND PRINCIPLES

13. The *scope* of this updated plan of action focusses on soils across agricultural, other productive landscapes and other relevant ecosystems. It is wide and far-reaching and context-dependent to ensure that it responds to specific situations and farmer typologies and that it prioritizes actions on the basis of country goals and the needs of direct beneficiaries.

14. The Initiative continues to be implemented as a cross-cutting initiative by Parties to the Convention, the Secretariat, FAO and its Global Soil Partnership in partnership with the work of the Intergovernmental Technical Panel on Soils, the Global Soil Biodiversity Initiative, the Science-Policy Interface of the United Nations Convention to Combat Desertification, education, academic and research bodies, donor agencies and the private sector, as well as relevant organizations, farmers, land owners and land managers, indigenous peoples and local communities, women, youth, subnational governments and civil society.

15. When linked to the post-2020 global biodiversity framework, the United Nations Decade on Ecosystem Restoration,[15] the United Nations Decade of Family Farming 2019-2028, the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, [16] the United Nations Framework Convention on Climate Change and the Paris Agreement[17], and United Nations Convention to Combat Desertification and land degradation neutrality targets, the scope of this plan of action can achieve multiple co-benefits of soil biodiversity processes for improved and more sustainable land-use practices.

16. The plan of action adheres to the *principles* of the ecosystem approach,[18] which is aimed at providing better biological, physical, economic and human interactions associated with sustainable and productive ecosystems.

17. The plan of action focuses on the improvement of livelihoods, on the implementation of integrated and holistic solutions adapted to national and subnational contexts and in developing synergies for better soil biodiversity research, monitoring and assessment at the corresponding level while ensuring multi-stakeholder participation.

18. The plan of action recognizes the role of farmers, smallholders, small-scale food producers, family farmers, peasants, landowners, land managers, foresters, ranchers, indigenous peoples, local communities, women, youth, education, academia and research bodies, civil society, subnational governments, the private sector, and other relevant stakeholders in the conservation, restoration and sustainable use of soil biodiversity and for the implementation of the plan.

19. FAO is invited to facilitate the implementation of the plan of action, and it is intended to align activities on soil biodiversity more closely with other FAO-related activities including the International Network on Soil Biodiversity and the Global Soil Biodiversity Observatory, to monitor and forecast the conditions of soil biodiversity and soil health as well as with regional and country offices in order to create synergies and provide broader support. The full implementation of the plan of action at the national and subnational levels will depend on the availability of resources.

IV. GLOBAL ACTIONS

20. To support the implementation of coherent and comprehensive policies for the conservation, restoration and sustainable use of soil biodiversity at all levels, the following global actions have been

[13] Ibid., vol. 2244, No. 39973.

[14] Ibid., vol. 2256, No. 40214.

[15] See General Assembly resolution 73/284 of 1 March 2019.

[16] General Assembly resolution 70/1.

[17] United Nations, *Treaty Series*, Registration No. I-54113.

[18] Decision V/6.

identified and can be considered, as appropriate and on a voluntary basis, by Parties and other Governments, in collaboration with relevant organizations:

(a) Develop protocols, [follow] [adopt] harmonized methods and use tools to collect and digitize soil biodiversity data and to improve mapping capabilities of Parties, acknowledging the differences in soil types across regions;

(b) Include soil biodiversity as an important component of soil description surveys using a large range of tools, including state-of-the-art methods and technology, and the development of bioindicators;

(c) Establish or strengthen, as appropriate, a monitoring network to assess and keep track of the abundance and diversity of multiple soil taxa or units and of the changes in soil biodiversity and its functioning, in accordance with national legislation;

[(d) Prepare a global assessment of soil biodiversity based on the compilation of national information captured from field assessments in all regions that addresses the gaps in soil knowledge at the global level and the need to invest in technologies to map soil biodiversity, especially in developing countries;]

[(e) Develop or identify and implement feasible indicators of soil biodiversity that are related to key ecosystem functions and services [and under the framework of the one-health concept];[19]]

(f) Strengthen education, research and capacity-building to use tools to monitor soil microbiodiversity and contribute to human, plant and soil health;

(g) Promote ecosystem-based approaches to conserve, restore and sustainably manage soil biodiversity in response to numerous challenges, such as loss of soil organic carbon and the need for sustainable management of soil in the context of climate change, soil degradation, the control, prevention and suppression of soil-borne diseases, enhancement of soil nutrients, food security [and food safety], reducing water scarcity and disaster risk;

(h) Engage with the United Nations Decade on Ecosystem Restoration, to pursue restoration of degraded soils and their multifunctionality, including the utilization of restored areas and degraded agricultural areas for food production and avoiding expansion to natural areas where feasible;

(i) Encourage civil society groups, research bodies, subnational governments, cities and other local authorities, traditional authorities from indigenous peoples and local communities, to become involved in the implementation of the plan of action;

(j) Encourage awareness-raising on the importance of soil biodiversity and its functions and services through subnational, national, regional and global platforms, such as FAO and GSP, which provide existing channels to be leveraged;

(k) Promote both in-situ and ex-situ conservation, restoration and sustainable use activities and management practices while strengthening the systems of knowledge of indigenous peoples and local communities;

(l) Identify the cumulative impacts of multiple sectors on the quality of soil biodiversity;

[(m) Promote good agricultural practices, including integrated pest management in order to prevent and address negative impacts of fertilizers and pesticides on soil biodiversity, based on risk assessment approaches;]

[(n) Identify sources of financial resources for the implementation of the action plan.]

V. KEY ELEMENTS AND ACTIVITIES

21. The plan of action comprises four main elements that could be undertaken, as appropriate [and on a voluntary basis], by Parties and other Governments, in collaboration with relevant organizations:

(a) Policy coherence and mainstreaming;

(b) Encouraging the use of sustainable soil management practices;

(c) Awareness-raising, sharing of knowledge, technology transfer and capacity-building and development;

(d) Research, monitoring and assessment.

Element 1: Policy coherence and mainstreaming

Rationale

Soil loss and soil biodiversity loss is a cross-cutting issue, and policies should be designed to integrate considerations not only into the context of sustainable agriculture and sustainable forest management, but also within other sectors, especially infrastructure, mining, energy, transport and spatial planning. Appropriate and coherent national and subnational policies are needed to provide an effective and enabling environment to support activities by farmers, with emphasis on small-holders, small-scale food producers, family farmers, women farmers, peasants, and land managers, foresters, indigenous peoples and local communities, youth and all relevant stakeholders. Inclusive policies that take soil biodiversity into consideration and promote its conservation, restoration and sustainable use can provide multiple benefits by linking agriculture, food production, forestry, marine, water, air, human health, culture, spiritual and environmental policies.

Activities

1.1 Promote the importance of mainstreaming soil biodiversity, including the conservation, restoration, sustainable use and management of soil biodiversity into policies aimed at the sustainability of agriculture, and other relevant sectors and support the development and implementation of coherent and comprehensive policies for the conservation, sustainable use and restoration of soil biodiversity at the local, subnational, national, regional and global levels;

1.2 Foster activities to safeguard and promote the importance as well as the practical application of soil biodiversity, and integrate them into broader policy agendas for food security, ecosystem and landscape restoration, climate change adaptation and mitigation, urban planning and sustainable development, including the post-2020 global biodiversity framework, UNCCD 2018-2030 Strategic Framework and the Sustainable Development Goals;

1.3 Promote the implementation of good practices of sustainable soil management[20] as a vehicle to promote integrated and holistic solutions that recognize the key role of above-ground/below-ground biodiversity interactions and of indigenous peoples and local communities and their traditional knowledge and practices, and that consider local contexts and integrated land-use planning, in a participatory manner;

1.4 Promote integrated ecosystem approaches for the conservation, restoration and sustainable use of soil biodiversity, considering, as appropriate traditional sustainable agricultural practices;

1.5 Promote policies that provide economic incentives for practices that protect or help increase soil biodiversity, avoiding policy measures that would [not be consistent with and would not be in harmony with the Convention [and World Trade Organization rules] and other relevant international obligations and] [distort trade] and create inefficiency; and [eliminate], [reform with a view to] phasing out incentives, including subsidies harmful to soil biodiversity;

[20] See FAO 2017. *Voluntary Guidelines for Sustainable Soil Management*. Food and Agriculture Organization of the United Nations. Rome. http://www.fao.org/3/a-bl813e.pdf

1.6 Develop policies and actions based on the recognition that soil biodiversity is central for sustaining all ecosystems and a key asset in restoring soil multi-functionality in degraded and degrading ecosystems;

1.7 Strengthen synergies between scientific evidence, conservation, restoration and sustainable practices, farmer-researcher community practices, agricultural advisory services and traditional knowledge of indigenous peoples and local communities to better support policies and actions;

1.8 Address linkages between soil biodiversity [and human health], nutritious, healthy diets and pollutants exposure, [including pesticides, veterinary drugs, and overflow of fertilizers];

1.9 Promote ways and means to overcome obstacles to the adoption of good practices in sustainable soil management associated with land tenure, the rights of users of land and water, in particular women, the rights of indigenous peoples and local communities, and the rights of peasants and other people working in rural areas, in accordance with national legislation and international instruments, recognizing their important contributions through their knowledge and practices, gender equality, access to financial services, agricultural advisory services and educational programmes;

1.10 Consider the use and implementation of existing tools and guidance at the national, subnational, regional and global levels, such as the FAO agroecology knowledge hub, the FAO Voluntary Guidelines for Sustainable Soil Management,[9] the FAO's Revised World Soil Charter,[21] the Code of Conduct on Pesticide Management [22] and the International Code of Conduct for the Sustainable Use and Management of Fertilizers;[23] the Committee on World Food Security's Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forest in the Context of National Food Security;[24]

1.11 Encourage Parties to include soil biodiversity in national reports and national biodiversity strategies and action plans, and coordinate at the national and subnational levels, in order to increase and improve public and private actions that improve soil biodiversity;

1.12 Promote coordinated spatial planning and other approaches to reduce the loss of soil and soil biodiversity and implement adequate monitoring of soil sealing.

Element 2: Encouraging the use of sustainable soil management practices

Rationale

Management practices and land-use decisions undertaken by farmers, ranchers, landowners, land managers, foresters, indigenous peoples, local communities, women and youth and all relevant stakeholders influence ecological processes, including soil-water-plant-atmosphere interactions with biodiversity. There is increasing recognition that the sustainability of agriculture and other managed systems depends on the optimal use of the available natural resources, biogeochemical cycles, biodiversity, including soil biodiversity, its functions and its contribution to ecosystem services. Improvement in sustainability requires the optimal use and management of soil fertility and soil physical properties and soil restoration, which rely, in part, on soil biological processes and soil biodiversity. Direct and indirect drivers of soil biodiversity loss need to be addressed at multiple scales, and special attention is needed at the farm and forestry level and across entire ecosystems.

[21] http://www.fao.org/documents/card/en/c/e60df30b-0269-4247-a15f-db564161fee0/

[22] http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/code/en/

[23] http://www.fao.org/3/ca5253en/ca5253en.pdf

[24] http://www.fao.org/3/i2801e/i2801e.pdf

Activities

2.1 Promote the improvement of soil health and the enhancement of soil organism abundance and diversity, by improving their food, water and habitat conditions through sustainable agricultural practices,[[25]] [such as agroecology and ecological intensification] [sustainable intensification] and the restoration of degraded soils to increase ecosystem connectivity and restore production areas;

2.2 Develop, enhance and implement science-based risk assessment procedures, in conformity with risk assessment techniques developed by relevant international organizations, [as appropriate], on a regular basis, considering field-realistic exposures and longer-term effects, [for veterinary drugs (e.g., antibiotics[26]), pesticides and pesticide-coated seeds, pollutants (including emerging substances, such as microplastics and new organic compounds), biocides and other contaminants to inform risk management decisions, to limit or minimize pollution and to promote the science-based application and minimization of veterinary drugs, fertilizers and pesticides (e.g., nematicides, fungicides, insecticides and herbicides)] [reducing the production and use of synthetic fertilizers,] to enhance the conservation, restoration and sustainable use of soil biodiversity, [human health and well-being];

2.3 Facilitate, for all relevant stakeholders, access to information, policies, tools and enabling conditions, such as access to technologies, innovation and funding, as well as to traditional practices that promote the conservation, restoration and sustainable use of soil biodiversity at the field level, taking into account the full and effective participation of indigenous peoples, local communities, women, youth, education, academia and research bodies, subnational governments and stakeholders in the implementation of this Initiative;

2.4 Encourage sustainable agricultural practices, [such as agroecology, integrated production systems (crop, livestock, aquaculture, forest and agroforestry), no-tillage systems, crop rotation in the field, fallow periods, inter-cropping, perennial crops, multicropping, cover crops, mixed crops, addition of organic matter and preservation and development of perennial vegetation in field margins and biodiversity refuges, and of landscape features, such as hedgerows, contour bunds and terraces,] recognizing the wide range of approaches to enhance the sustainability of agricultural systems;

2.5 Facilitate site-specific remediation of contaminated soils,[27] preferring those alternatives that show minor risks to biodiversity, while exploring the implementation of bioremediation strategies that use native microorganisms;

2.6 Prevent the introduction and spreading, and minimize the impact of invasive alien species that present a direct and indirect risk to soil biodiversity, and monitor the dispersion and eradicate, control or manage those already established;

2.7 Protect, restore and conserve soils that provide significant ecosystem services, including through the use of sustainable soil management practices;

2.8 Promote sustainable soil and associated water and land management practices that maintain, restore and promote the resilience of carbon-rich soils (such as peatlands, black soils, mangroves, coastal wetlands, seagrasses and permafrost);

[[25] These practices may include: agroforestry; the maintenance of adequate soil organic matter content and soil microbial biomass; provision of sufficient vegetative cover; multicropping; longer crop rotation; minimization of soil disturbance and tillage; no-tillage systems; use of organic fertilizers; use of biological nitrogen fixation; appropriate management of agricultural waste; integrated pest management; optimization and minimization of agricultural chemicals, in accordance with science-based risk assessment; and presence of native habitats within agricultural landscapes.]

[26] [For example, antibiotics used on livestock that can seep into the soil.]

[27] The importance of special soils creating environments for specific soil biota (for example, natural extremely acidic or alkaline soils; natural hypersaline soils; natural soils containing high quantities of rare elements) should be recognized. Although they are not necessarily productive or high biodiverse soils, they host important communities as gene reserves and merit protection as they may contain unknown, adapted organisms that can be useful in the future.

2.9 Promote sustainable soil and associated water and land management practices that support the achievement of land degradation neutrality;

2.10 Promote ecosystem-based approaches to avoid land-use changes that cause soil erosion, the removal of surface cover and loss of soil moisture and carbon, and implement mitigation measures to alleviate degradation [while preventing and avoiding potential impacts arising from the implementation of approaches and practices of soil mitigation on indigenous peoples and local communities, small-scale food producers and peasants];

2.11 Promote conservation, restoration and sustainable management of soil biodiversity, and implement where appropriate, ecosystem-based approaches for adaptation, mitigation and disaster risk reduction [while preventing and avoiding potential impacts arising from the implementation of approaches and practices of soil mitigation onindigenous peoples and local communities, small-scale food producers and peasants];

Element 3: Awareness-raising, sharing of knowledge and capacity-building

Rationale

Increased awareness and understanding are critical for the development and promotion of improved practices for the conservation, restoration and sustainable use of soil biodiversity and ecosystem management. This requires collaboration that ensures the full and effective participation of and feedback from a broad range of stakeholders, including farmers, landowners, land managers, smallholders and small-scale food producers, indigenous peoples and local communities, women and youth, decision makers, education, academia and research bodies and relevant institutions and organizations to ensure effective actions and collaborative mechanisms. Strengthening capacities to promote integrated and multidisciplinary approaches is needed to ensure the conservation, restoration, sustainable use and enhancement of soil biodiversity. This will further improve information flows and cooperation among actors to identify best practices and foster the sharing of knowledge and information.

Activities

3.1 Increase understanding and appreciation of the role of soil biodiversity and soil health in agroecosystems, forests, silvopastoral and other managed ecosystems, and of their effect on land management practices and ecosystem health;

3.2 Increase understanding and appreciation of the causes and consequences of soil biodiversity decline in specific agroecosystems, other managed ecosystems and natural environments and engage targeted key stakeholder groups, including farmers, ranchers, foresters, civil society, education, academia and research bodies, the mass media, and consumer organizations on the importance of soil biodiversity for health, well-being and livelihoods;

3.3 Strengthen understanding and appreciation of the impacts of sustainable land-use and soil-management practices, as an integral part of agricultural and their importance for sustainable livelihoods;

3.4 Promote awareness-raising and sharing of knowledge through tools and digital technology and promote capacity-building and mutual learning, including at the local and field levels by developing collaborative activities, such as peer-to-peer learning, for the promotion of best practices for soil biodiversity assessment, management and monitoring for all land management activities;

3.5 Enhance education on, and knowledge of soil biodiversity, soil health and the ecosystem functions and services they provide, through the update of educational curricula for professionals, in such fields as economy, agronomy, veterinary, taxonomy, microbiology, zoology and biotechnology, and through the creation and dissemination of training and information materials on soil biodiversity;

3.6 Support citizen science campaigns and awareness-raising activities to engage relevant stakeholders in the conservation, restoration and sustainable use of soil biodiversity, including celebrations on 5 December of World Soil Day, which was designated by the General Assembly of the United Nations in 2013;[28]

3.7 Build and strengthen the capacities of farmers, landowners, land managers, foresters, ranchers, the private sector, education, academia and research bodies, indigenous peoples and local communities, women and youth, and vulnerable communities, as appropriate, in designing and implementing sustainable soil management practices and the sustainable application of soil biodiversity and consider traditional knowledge and practices;

3.8 Compile, protect, maintain, promote [and share] traditional knowledge, innovations and sustainable practices of indigenous peoples and local communities, with their [free, prior and informed consent] [prior and informed consent, free, prior and informed consent, or approval and involvement], related to soil biodiversity maintenance, soil fertility and sustainable soil management and promote work mechanisms between traditional agricultural knowledge and scientific knowledge that contribute to implementing sustainable agricultural practices in accordance with local agroecological and socioeconomic contexts and needs;

3.9 Develop partnerships and alliances that support multi-disciplinary approaches, foster synergies and ensure multi-stakeholder participation with respect to sustainable soil management;

3.10 Foster scientific and technical cooperation and transfer of technology to promote access to the latest technologies and molecular tools for modern soilless agriculture, soil biodiversity assessment and monitoring in developing countries [in particular the least developed countries and small island developing States among them, and countries with economies in transition].

Element 4: Research, monitoring and assessment

Rationale

Assessing and monitoring the status and trends of soil biodiversity, of measures for the conservation, restoration and sustainable use of soil biodiversity and of the outcomes of such measures, is fundamental to inform adaptive management and to guarantee the functioning of all terrestrial ecosystems, including the long-term productivity of agricultural soils. Soil biodiversity data that can be globally aggregated is needed to guide the decision-making process, with particular focus on those regions and areas currently lacking data. Education, academia and research bodies and relevant international organizations and networks should be encouraged to undertake further research, taking into consideration soil biodiversity functions, regional pedodiversity,[29] and relevant traditional knowledge, [free prior and informed consent] [with prior and informed consent, free prior and informed consent, or approval and involvement] to address gaps in knowledge, and to expand research and to support coordinated global, regional, national, subnational and local monitoring efforts.

Activities

4.1 Increase national capacities on soil biodiversity taxonomy and address taxonomic assessment needs in different regions, and design targeted strategies to fill the existing gaps;

4.2 Promote further research to identify ways to integrate the application of soil biodiversity into farming systems as part of efforts to improve yield quantity and facilitate the harmonization of protocols for research, data collection, management and analysis, storage and curation of samples;

[28] See General Assembly resolution 68/232 of 20 December 2013 on World Soil Day and International Year of Soils.

[29] The term "pedodiversity" and many tools for studying pedodiversity were adapted from biology. Pedodiversity, for example, can be measured just as biodiversity is measured by means of special indices showing the abundance of species and the taxonomic distances between them. A set of mathematical methods, both parametric and non-parametric, can be applied to quantify soil spatial heterogeneity

4.3 Promote further research to identify risks to soil biodiversity under climate change and potential adaption measures and mitigation tools, as well as risks caused by the use of hazardous or toxic chemicals, including the potential loss of key species and their habitats, as well as the role of soil biota in wider ecosystem resilience and restoration that contributes, as appropriate, to the formulation of policy plans;

4.4 Promote research and implementation of integrated pest management practices, [biological pest control, reverse logistics for pesticide packaging, and the application of biological inputs,] as they interact with functions and services provided by soil biodiversity [, taking into account the negative impact of unsustainable use of pesticides on soil organisms to support the development of more feasible and sustainable alternatives];

4.5 Promote capacity-building and research in order to qualify and quantify soil biodiversity in agriculture and in other managed ecosystems and cultural landscapes, and to develop consistent and comparable protocols to monitor soil quality;

4.6 Promote research, information management and dissemination, data collection and processing, community-based monitoring, transfer of knowledge and technologies, including modern geospatial technologies, [genomic technologies] [molecular biology techniques] and networking;

4.7 [Promote] [Ensure] access to the fair and equitable sharing of the benefits arising out of the utilization of genetic resources in the soil, considering the potential to develop new products and medicines, in line with the third objective of the Convention and with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization;

4.8 Mobilize targeted participatory research and development, ensuring gender equality, women's empowerment, youth, [gender-responsive approaches] and the full and effective participation of indigenous peoples and local communities in all stages of research and development;

4.9 Develop and apply tools to assess the status of soil biodiversity in all regions and to address gaps in knowledge in all levels, by using a range of available tools, from traditional macroorganism and soil fauna observation and analysis, national and subnational statistics, soil surveys, to cutting-edge approaches and new technologies, as appropriate;

4.10 Generate data sets on soil biodiversity, pedodiversity and on soil degradation at the national, subnational and regional levels through a standard monitoring process that allows the creation of regional, national, subnational and local visual maps, georeferenced information systems and databases to indicate the status and trends of soil biodiversity and crop-specific vulnerability to support informed decision-making and comparisons;

4.11 Promote dissemination, co-creation of knowledge and exchange of information and data, in line with Articles 8(j) and 8(h) of the Convention on Biological Diversity and, through transdisciplinary approaches, ensure that all decision makers and stakeholders have access to reliable and up-to-date information;

4.12 Encourage the development of harmonized definitions, standard baselines, indicators and national and subnational-level monitoring activities of soil biodiversity with the inclusion of a vast range of soil organisms, from microorganisms to fauna, as well as monitoring the effectiveness of soil management interventions in the field;

4.13 Promote regional cooperation to compile, systematize and share [data and] lessons resulting from experiences or case studies on the implementation of sustainable soil management practices in the context of agricultural practices with positive impacts on soil biodiversity;

[4.14 Encourage and support the development of community-based monitoring and information systems or simplified assessment methodologies and tools for measuring soil biodiversity, which are accessible by all regions of the world;]

4.15 Promote research and capacity-building on sustainable soil management practices, [including agroecological and other biodiversity-friendly management practices,] [including sustainable intensification,] that ensure conservation, restoration and sustainable use of soil biodiversity;

4.16 Promote development of commercial application, in a sustainable manner, of products based on soil biodiversity.

VI. SUPPORTING VOLUNTARY GUIDANCE, TOOLS, ORGANIZATIONS AND INITIATIVES RELATING TO THE CONSERVATION AND SUSTAINABLE USE OF SOIL BIODIVERSITY

22. Relevant voluntary guidance and tools developed under the Convention, and those developed by partner and relevant organizations and initiatives, such as the Voluntary Guidelines for Sustainable Soil Management and the World Soil Charter, issued by FAO, will be made available in the clearing-house mechanisms.

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