Food and Agriculture Organization of the United Nations

GLOBAL SOIL PARTNERSHIP

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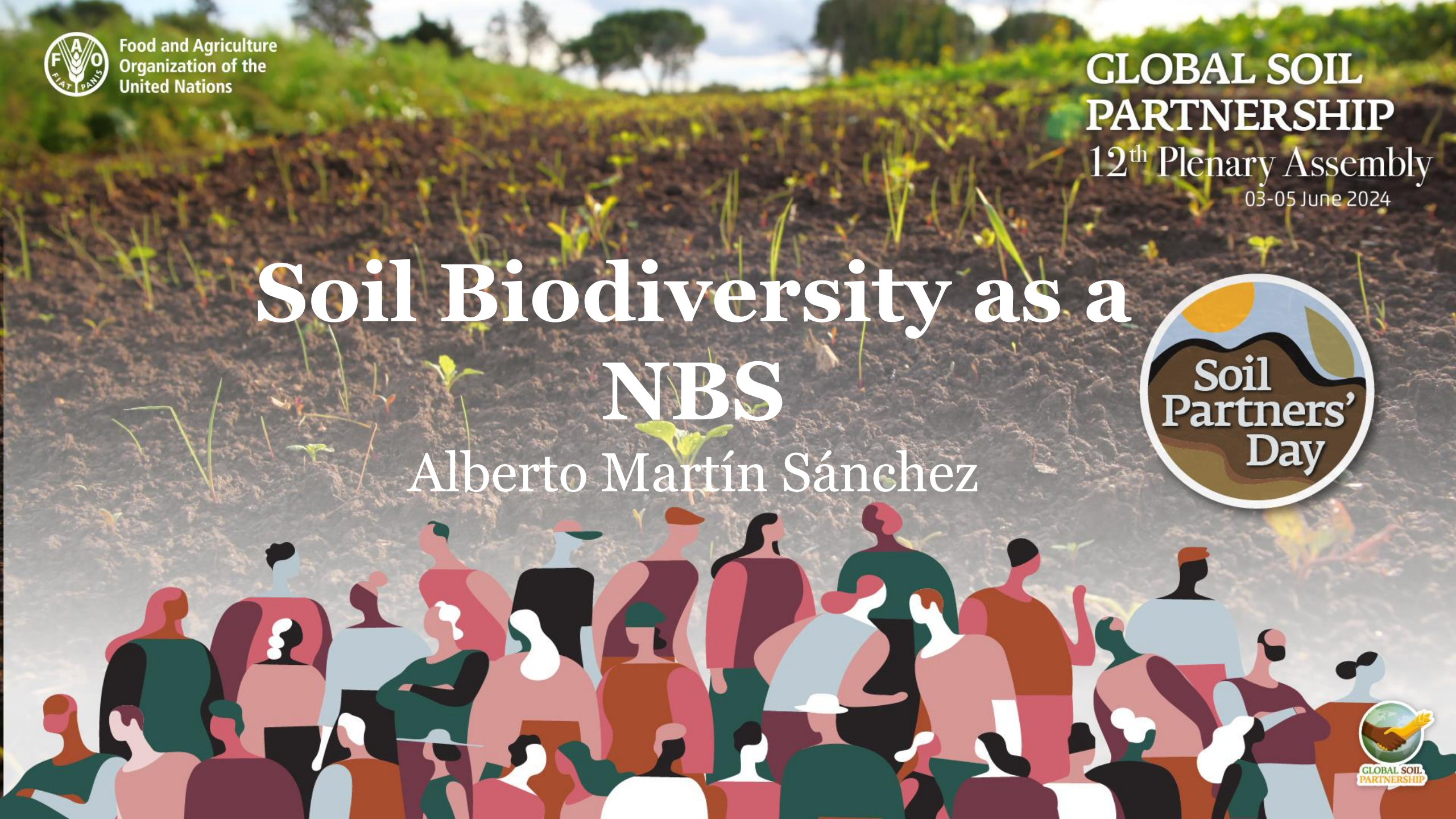
03-05 June 2024

Soil Biodiversity as a NBS

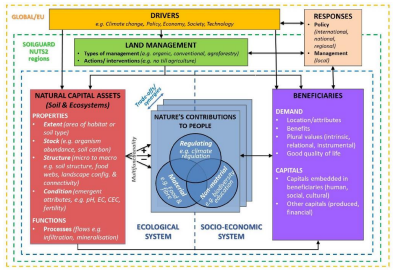
Alberto Martín Sánchez

Soil Partners' Day



Soil biodiversity as a NbS

Soil Biodiversity and Wellbeing Framework



IUCN Global Standard for NbS

Soilguard Assessment Tool

Assessment process

Results of the assessment

Management and conservation recommendations

Bibliographic review

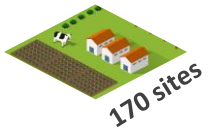
Biomes

Management practices

Grasslands

Mixed species
Monoculture

Croplands



Conventional
Organic farming

Forestlands

Continuous cover
Clear-cutting

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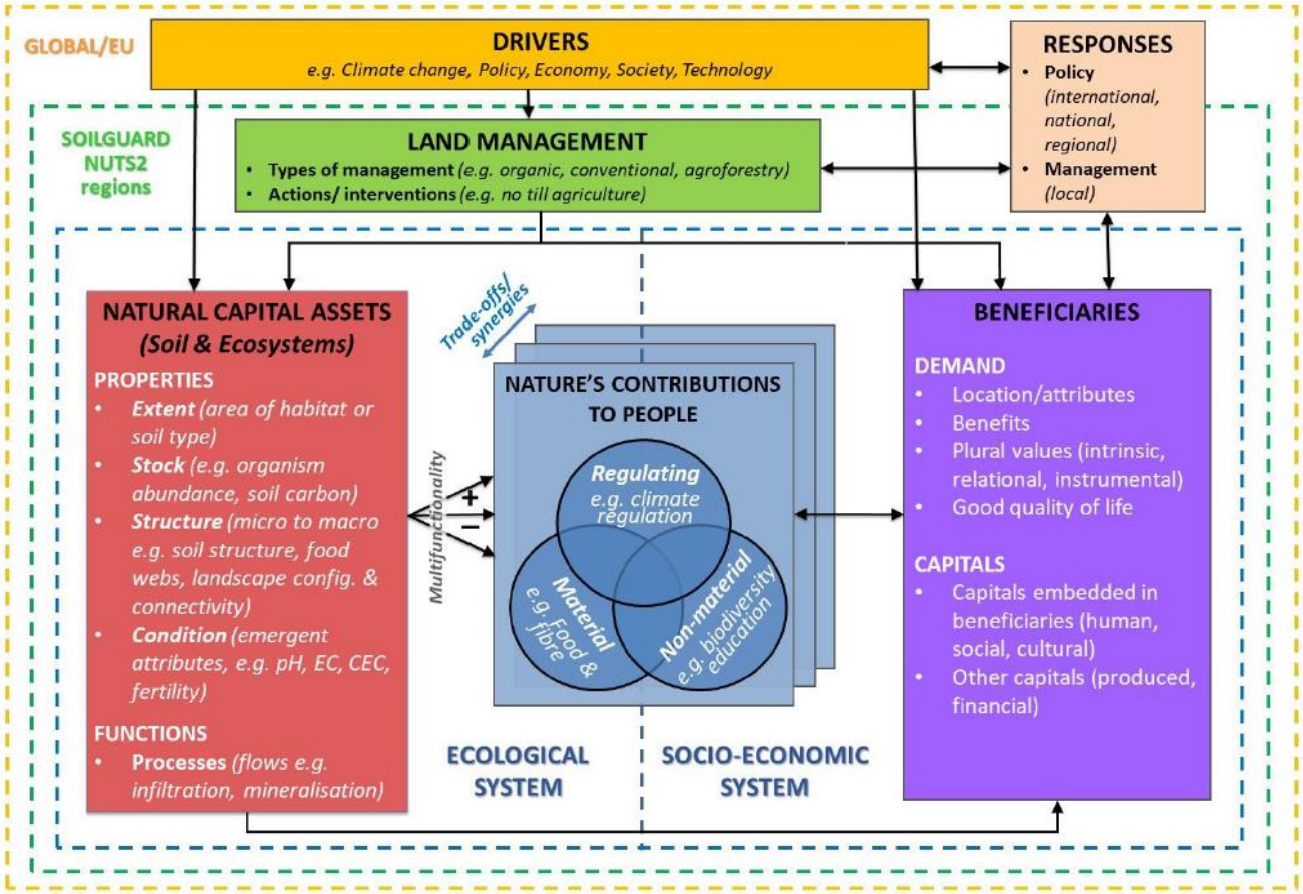
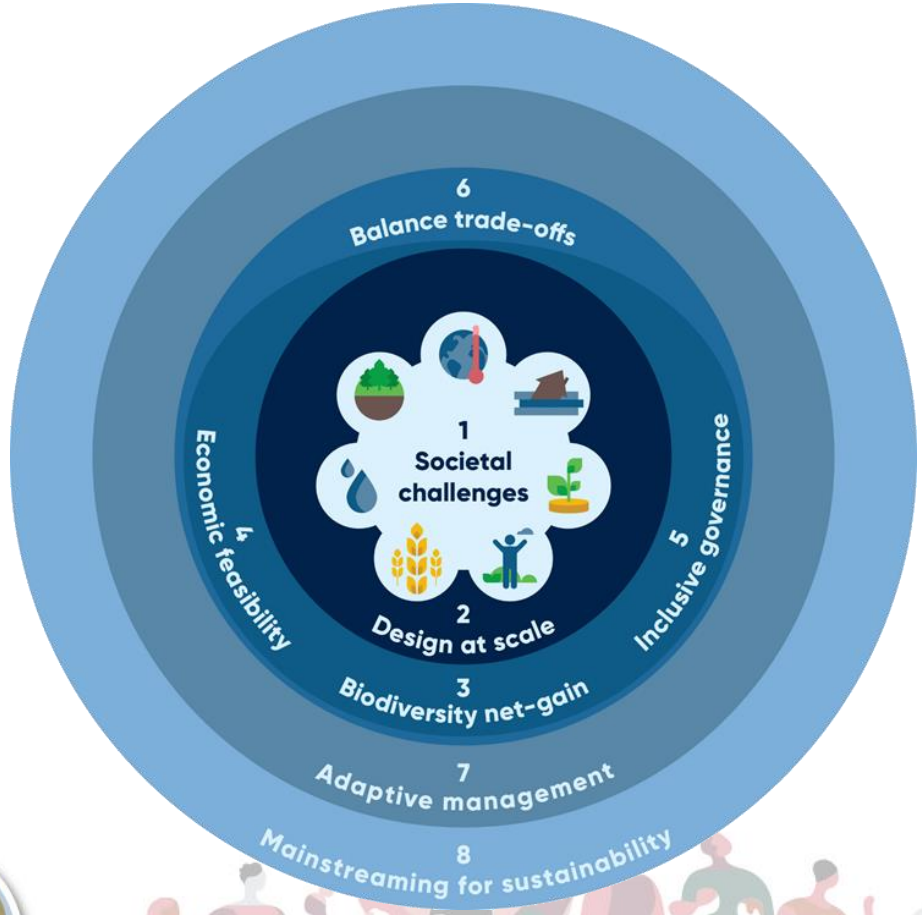
Assessment of Sustainable Soil Management practices

Soil Biodiversity and Wellbeing Framework



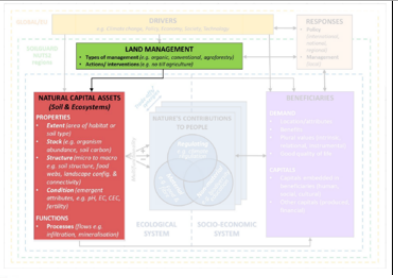
IUCN Global Standard for NbS

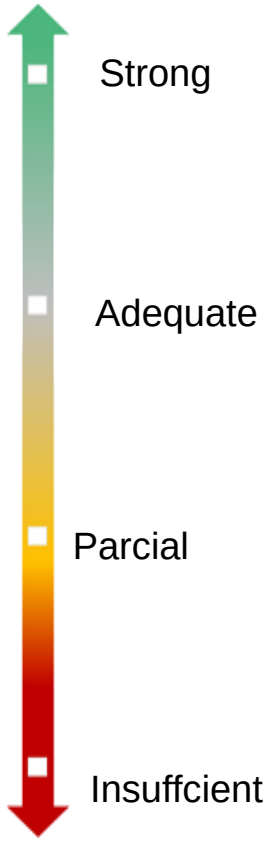


Criteria	
1	NbS effectively address societal challenges
2	Design of NbS is informed by scale
3	NbS result in net gain to biodiversity and ecosystem integrity
4	NbS are economically viable
5	NbS is based on inclusive, transparent and empowering governance processes
6	NbS equitably balances trade-offs between achievement of its primary goal(s) and the continued provision of multiple benefits
7	NbS are managed adaptively, based on evidence
8	NbS are sustainable and mainstreamed within an appropriate jurisdictional context

Soilguard assessment tool

- Design, verification and scaling up SSM practices
- 15 criteria structured in 3 categories
- Integrating:
  - Soil Biodiversity and Wellbeing Framework
  - IUCN Global Standard for NbS

Relationship assessed	Criteria	Clarification to the criteria	Guiding questions	Score Use drop down menu to input how well intervention matches to indicator	Justification Explain briefly why the given response was chosen. Include evidence if possible and address the guiding questions.	Barriers for achieving the criteria	Recommendations to better integrate those practices within the criteria
	SSM practices respond to the current state of the ecosystems and soil biodiversity	SSM interventions must be based on a proper understanding of the **initial state of soil biodiversity and should be founded upon a clear comprehension of the current status of the ecosystems concerned**. The current condition of Natural Capital Assets needs to be assessed and characterized in terms of ecological state. This involves identifying drivers of ecosystem degradation and loss, as well as opportunities to enhance ecosystem integrity and connectivity. Both local and scientific knowledge should be utilized for this purpose. **The assessment should take into account** 1) **attributes of soils and ecosystems** that are crucial for delivering NCP, including extent, stock, structure, and condition, and 2) **the functions or processes occurring within soils that support NCP**. The assessment should be conducted at four different scales: the field scale (e.g., soils), the farm/exploitation scale (e.g., domestic and wild species diversity), the territory or landscape scale (e.g., connectivity), and the regional or national scale (e.g., pollution, land use change, etc.).	Has been the current state of the ecological systems assessed? Is this assessment conducted at the appropriate spatial scale? Have the drivers of ecosystem degradation and biodiversity loss been assessed? Does the assessment include field verification? Is both scientific and local knowledge taken into account? Have the requirements to maintain or recover ecosystem integrity been identified? Have opportunities to enhance ecosystem connectivity and integrity been assessed? Do SSM practices respond to the assessment and the identified drivers of ecosystem degradation and biodiversity loss, as well as the opportunities to maintain or recover ecosystem integrity and connectivity?	PARTIAL	Current state of ecosystems is routinely and continuously monitored throughout Finland, but based on just a few key characteristics related to above-ground species assemblages and habitats. Soil issues are all but ignored, and the specific knowledge base is undeveloped. However, the main drivers in soil ecosystems have been identified and remedies designed relying on basic soil sieince, but need to be locally verified to enhance credibility and impact. This work is in progress also in the DISTDYN NbS venture.	The 30-year biodiversity-management paradigm that has focused on above-ground features and simplistic solutions. Lack of research and resources in the soil context	To ramp up awareness leading to resource expansion for soil biodiversity research and political discourse on the detrimental impacts of clearcutting and oppurtunities to remedy through CCF



Results of the assessment - Influences and impacts

Criterion		Average score
1	SSM practices respond to **the current state of the ecosystems and soil biodiversity**	Partial
2	SMM practices recognise and respond to the **interactions between the economy, society and ecosystems** and integrate **complementary interventions**	Partial
3	**Risks and trade-offs** are identified, managed, and inform **corrective actions and safeguards**	Partial
4	SSM must **address societal challenges** that have been identified, thoroughly understood, and well-documented	Adequate
5	SSM practices have a **positive impact on soil biodiversity and ecosystem integrity** and the impact is periodically assessed	Partial
6	SSM practices have a **positive impact on human wellbeing** and the impact is periodically assessed	Insufficient

Results of the assessment - Beneficiaries

Criterion		Average score
7	The stakeholders and beneficiaries have been identified and **governance processes** are participatory, inclusive, transparent and empowering	Partial
8	The **rights, usage of and access to land and resources,** along with the responsibilities of different stakeholders are acknowledged and respected	Partial
9	SSM practices are **economically viable**	Partial

Results of the assessment - Responses

	Criterion	Average score
10	**Lessons learned** are documented and shared	Adequate
11	SSM practices are **managed adaptively,** based on iterative learning	Partial
12	A **monitoring and evaluation** plan is implemented to assess unintended adverse consequences on nature and review the established safeguards.	Partial
13	**Relevant policies, regulation frameworks and national and global targets** are **identified and considered** in the SSM practices design	Adequate
14	SSM practices **inform and enhance** facilitating **policy and regulation frameworks and contribute to national and global targets**	Adequate

Bibliographic review - Practices and impacts

Other practices and management systems that can have a positive impact on soil biodiversity:

CROPLANDS

Cover crops, mulching, no-tillage and reduce the tillage, soil organic amendments and the maintenance o crop residue cover and non-productive elements on the soil.

AGRICULTURAL GRASSLANDS

Plant diversity, the presence of legume and deep roots species, the level and type of fertilization and the absence of overgrazing

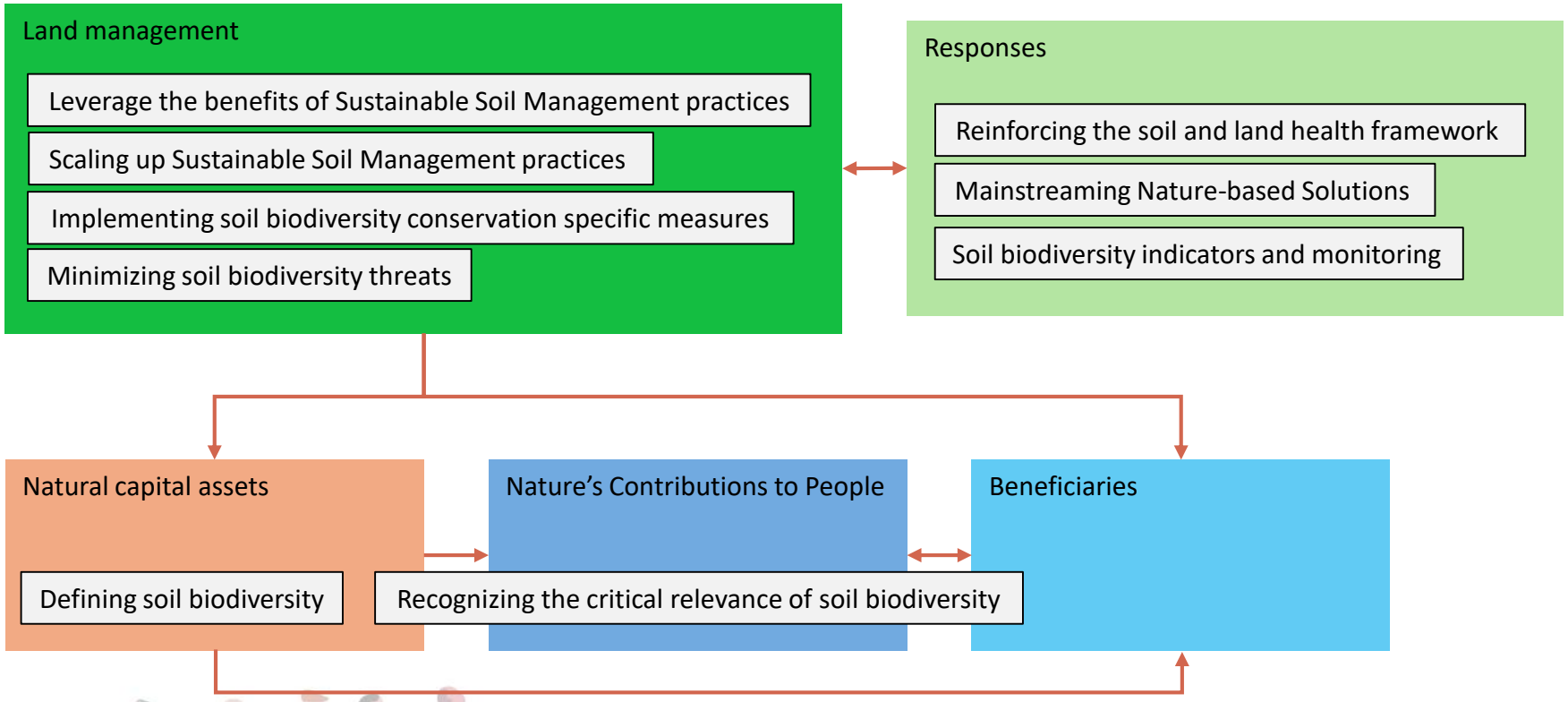
FORESTLANDS

Lowering the intensity of timber harvesting, maintenance of dead wood, coarse woody debris, large legacy trees and refugee plants, the preservation of the forest floor

Soil biodiversity conservation

Soil biodiversity conservation

Recommendations



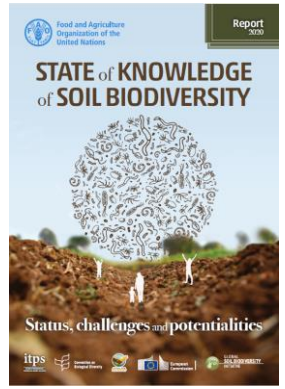
Soil biodiversity definition

Soil biodiversity by considering the **abundance, biomass, and diversity of soil organisms, targeting prokaryotes** (encompassing bacteria and archaea) **as well as eukaryotes** (including fungi, protists, nematodes, arthropods, and earthworms).

SOILGUARD

Soil biodiversity is **variety of life belowground, from genes and species to the communities** they form, as well as the **ecological complexes** to which they contribute and to which they belong, from soil micro-habitats to landscapes

FAO et al., 2020



Soil biota include **bacteria, fungi, algae, protists, viruses, nematodes, acari** (including mites), **collembola** (springtails), **annelids** (primarily earthworms), **macroarthropods** (such as spiders, ants and woodlice) **and vertebrates** (like voles, moles and shrews), **and also the plants** whose root exudates provide food for soil organisms in a zone around the roots known as the 'rhizosphere'.

Larbodière et al., 2020

Organisms that spend a key part of their life cycle within a soil profile, or predominantly inhabit the soil-litter interface. This includes **soil megafauna, macrofauna, mesofauna, microfauna/flora, fungi, and micro-organisms.** Plants are not tagged as soil species for the IUCN Red List.

IUCN definition for soil biota used by the Red List of Threatened Species

IUCN RED LIST

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Leverage the benefits of SSM practices

Sustainable management benefits on soil functionality compared to conventional management

- The positive impact especially relevant **in croplands with low organic carbon**
- Conversions from conventional to organic would be more effective **in regions with a less dry climate**

Diversifying management practices for maximizing ecosystem functions

Soil biodiversity conservation measures

- Local soil characteristics influence patterns in soil biodiversity
- Conservation **efforts across all biogeographical regions and land uses**

  Diversifying land uses could play a role in conserving biogeographical patterns of diversity

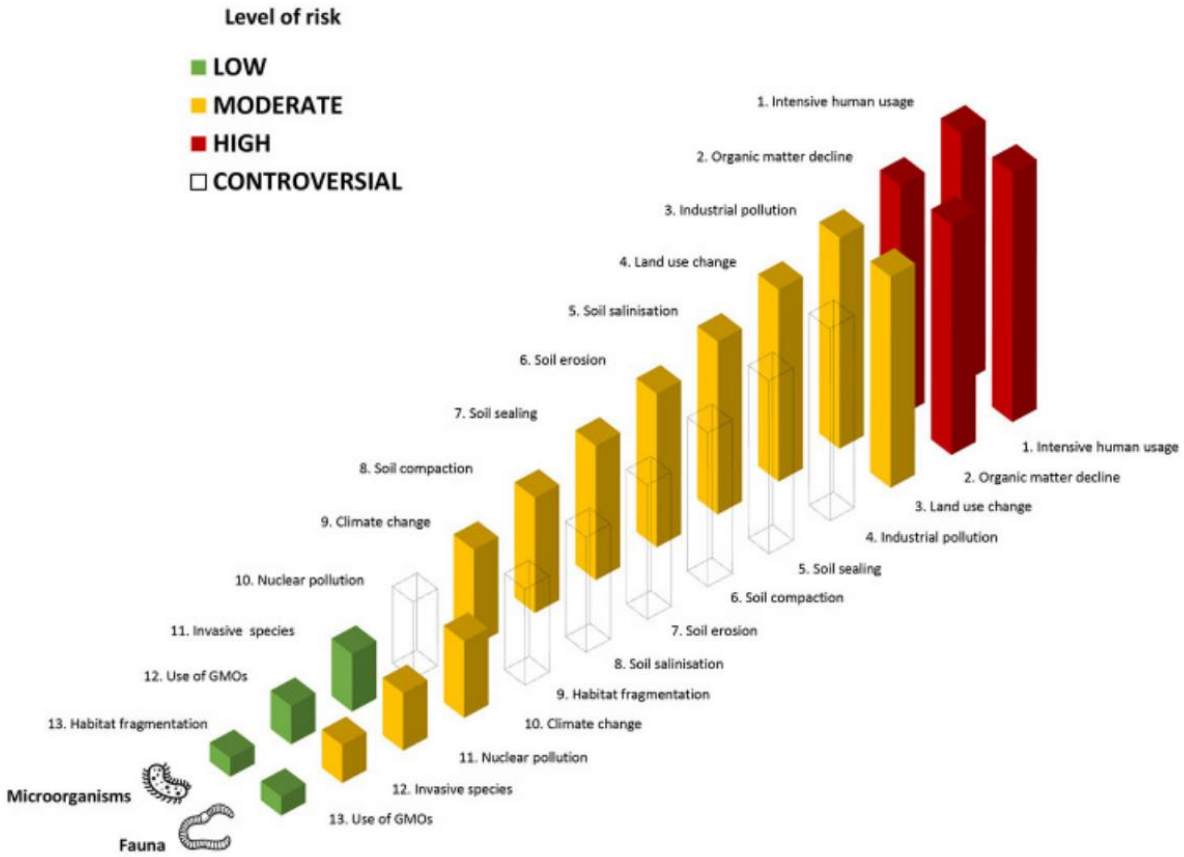
  Protection of the soil food web and individual species

Minimizing soil biodiversity threats

Land use intensification: **activities undertaken with the intention of enhancing the productivity or profitability per unit area** of land use, including:

- Land use conversion
- Increasing inputs
- Crop or product change

Intensive agricultural practices can include: tillage, monoculture, synthetic pesticides and excess of fertilisers applications



Level of risk associated with 13 potential threats to soil microorganisms and fauna. Numbers indicate the position of each threat, from least risky (smallest numbers) to most risky (largest numbers). Source (Orgiazzi, 2022), based in the work developed by (Orgiazzi, Panagos, et al., 2016).

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Reinforcing the soil health framework

- Increase the adoption the soil health concept to incorporate the biological perspective into soil management

Common ground between agriculture and conservation actors

- Scientific, technical and operational perspective

Recognizing the critical relevance of soil biodiversity

- Value the soil biodiversity
- Deepen our **understanding of the relationships** between soil management practices, soil biodiversity, and human wellbeing

  Increase attention and resources for soil biodiversity conservation and sustainable land management
- Mainstreaming **Nature-based Solutions**

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THANK YOU

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