What can policy makers do now?

To achieve large scale implementation of SLM solutions, simultaneously addressing DLDD, climate change adaptation and mitigation, policy makers can play a crucial role by creating an enabling environment at national and subnational levels to overcome barriers to the large-scale implementation of SLM. This includes specifically:

- Mainstreaming best practices for SLM into national integrated land-use planning strategies.
- Supporting the implementation of SLM as one of the means to achieve LDN.
- Developing and supporting economic incentives for the implementation of SLM through sustainable business models, subsidies and/or payments for ecosystem services schemes.
- Improving land tenure security to incentivize land users to invest in SLM.
- Supporting capacity building, knowledge development and knowledge exchange on SLM between land users, scientists, practitioners and policy makers at all relevant levels of decision-making.
- Institutionalizing meaningful stakeholder engagement with land users, scientists and civil society through-out the planning, implementation and monitoring phases of SLM strategies.
- Supporting transdisciplinary research programmes aimed at: 1) multi-objective assessments of SLM, including synergies and trade-offs for the natural environment and human well-being; 2) identifying barriers and enabling conditions for the implementation of SLM practices; and 3) building on participatory research methods.

Scaling up implementation of Sustainable Land Management

The success of creating synergies for addressing DLDD, climate change adaptation and mitigation through SLM practices depends on sustaining and scaling up the implementation of SLM practices that have proven successful. This is an important social and institutional challenge and requires creation of an enabling environment.

Despite scientific advances in understanding the causes and outcomes of land degradation, adoption of SLM practices is often limited to a minority of innovative land-users and practitioners. Barriers for the implementation of SLM are related to technological, ecological, institutional, economic and sociocultural aspects such as:

- **Limited finance and access to capital** for the implementation and maintenance of SLM.
- **Lack of access to appropriate technologies, equipment or inputs** (e.g. insufficient availability of land, labour, biomass, energy, water or plants).
- **Lack of access to knowledge and information** on SLM options and their proper implementation.
- **National policies, regulations, and inadequate governance structures** that inhibit decision-making at different scales or cross-sectoral planning, insecure land tenure, and absent or poorly functioning research and extension services.
- **Stakeholder perception** of the potential costs and benefits of SLM and the costs and benefits of no action.

To trigger the wide-scale adoption of SLM practices, **tangible short- and long-term benefits for land users,** such as yield increases, resistance to drought and/or monetary incentives must be evident, demonstrable, and achievable. Land users and managers are most likely to adopt SLM practices if they are convinced it maintains or enhances production and food security and if there are economic benefits or other direct incentives that ensure or enhance their livelihoods and well-being. However, this needs to be accompanied by appropriated policy instruments that promote upscaling, knowledge exchange and capacity building while respecting local circumstances and priorities.

Examples of policy instruments that **incentivize the implementation of SLM practices** by creating an enabling environment include:

- Long-term government commitment to provide policy instruments that facilitate the implementation and maintenance of SLM practices.
- Effective and accessible communication and good availability of (research) information on SLM options and impacts and relevant legislation through extension services, open source data and by strengthening knowledge exchange networks.
- Increased opportunities for local training, education, capacity-building and support for the implementation of SLM practices
- Supporting the establishment or reinforcement of sustainable business models and investment opportunities for SLM practices.
- Developing compensation schemes to compensate land owners and managers for the implementation or maintenance costs of SLM practices that protect ecosystem services for society as a whole.

The consideration of local needs and traditional knowledge considerably increases the level of acceptability and success of SLM practices among the land users and decision-makers. Therefore, decision-making on effective

SLM practices requires a participatory framework that facilitates co-creation of solutions, knowledge exchange and discussion among land users, policymakers at different decision-making levels, scientists, civil society organizations and other stakeholders throughout the planning, implementation and monitoring of SLM practices.

To continuously strengthen the scientific sound basis supporting SLM policies, transdisciplinary research should focus on reducing uncertainties by analysing and promoting long-term experiments, scaling up results through meta-analyses and modelling studies, quantifying synergies and trade-offs for the natural environment and human well-being at local and regional scales, and identifying barriers to implementation and opportunities for creating an enabling environment. These assessments should include co-benefits and trade-offs based on a complete value chain and socioeconomic analysis as well as on local knowledge. In this context, engaging stakeholders in the generation of knowledge though participatory processes is crucial.

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- UNCCD-SPI. 2016. Land in Balance. The Scientific Conceptual Framework for Land Degradation Neutrality. Science-Policy Brief 02. United Nations Convention to Combat Desertification, Science-Policy Interface (UNCCD-SPI) (www.unccd.int/Lists/SiteDocumentLibrary/Publications/10_2016_spi_pb_multipage_eng.pdf).
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The mission of the UNCCD Science-Policy Interface (SPI) is to facilitate a two-way dialogue between scientists and policy makers in order to ensure the delivery of science-based, policy-relevant information, knowledge and advice.

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United Nations Convention to Combat Desertification

SCIENCE-POLICY BRIEF

UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION
SCIENCE-POLICY BRIEF 03— August 2017

United Nations Convention to Combat Desertification

Sustainable Land Management for Climate and People

Why Sustainable Land Management?

Land provides crucial ecosystem services for human existence and human well-being, including provisioning, regulating, supporting and cultural services (Figure 1). Those services provide among others the production of fresh air, food, feed, fuel and fibre. They regulate the risks of natural hazards and climate change, offer cultural and spiritual values to our society, and support key ecological functions such as nutrient and water cycling, filtering and buffering, and are central to economic vitality. However, Desertification, Land Degradation and Drought (DLDD) as well as climate change can negatively affect the provision of these ecosystem services with potentially severe implications for food security, livelihoods, and human well-being.

Sustainable Land Management (SLM) represents a holistic approach to preserve all ecosystem services in long- term productive ecosystems by integrating economic, sociocultural and biophysical needs and values. Scientific evidence increasingly highlights the advantages of adopting SLM practices as land-based solutions that have the potential to simultaneously address Desertification, Land Degradation and Drought (DLDD), climate change adaptation and mitigation, while often achieving other co-benefits, such as protection of biodiversity.

This Policy Brief provides scientifically-sound guidance for decision-makers to help develop SLM strategies and related policies that promote synergies and address trade-offs between multiple objectives related to DLDD, climate change mitigation and adaptation, and for creating an enabling environment to overcome possible barriers for selection and large-scale implementation of effective SLM practices considering local realities.

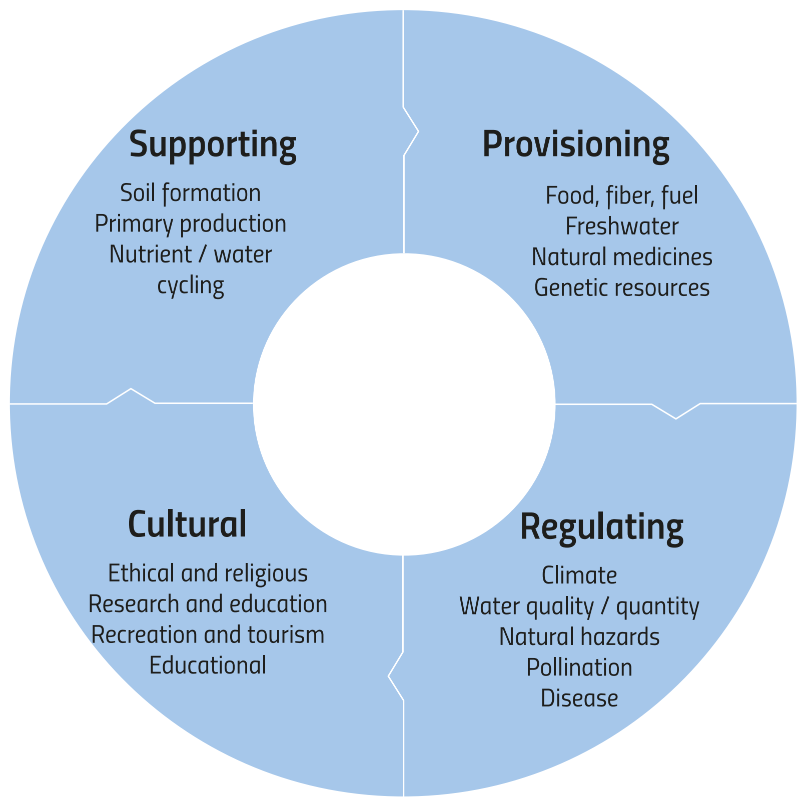

Figure 1: SLM and ecosystem services

How does SLM contribute to sustainable development at the nexus of the Sustainable Development Goals (SDGs)?

SLM strongly supports the objectives of the three Environmental Rio Conventions (UNCCD, UNFCCC, CBD) through its positive impacts on productivity, increased resilience to climate change, reduced greenhouse gas emissions and through its protection of biodiversity **(Figure 2).** SLM contributes directly to achieving multiple Sustainable Development Goals (SDGs), such as SDG 15 (life on land), which focuses on the achievement of Land Degradation Neutrality (LDN) by introducing land management practices that prevent the loss of healthy land and maintain or improve the land's productivity. By enhancing food security and other livelihood benefits and by increasing the resilience of the land and the populations depending on it. SLM also contributes to SDG 1 (end to poverty), SDG 2 (zero hunger), and SDG 3 (good health and well-being). In addition, SLM contributes to SDG 6 (clean water and sanitation) through its contribution to sustainable water management, and it has strong potential to contribute to climate change adaptation and mitigation as defined by SDG 13 (climate action). There is a growing number of examples of SLM providing economic opportunities, for example through lower fertilizer and pesticides requirements, reduced damage by soil erosion, stable crop yields, and through development of sustainable business cases based on responsible consumption and production.

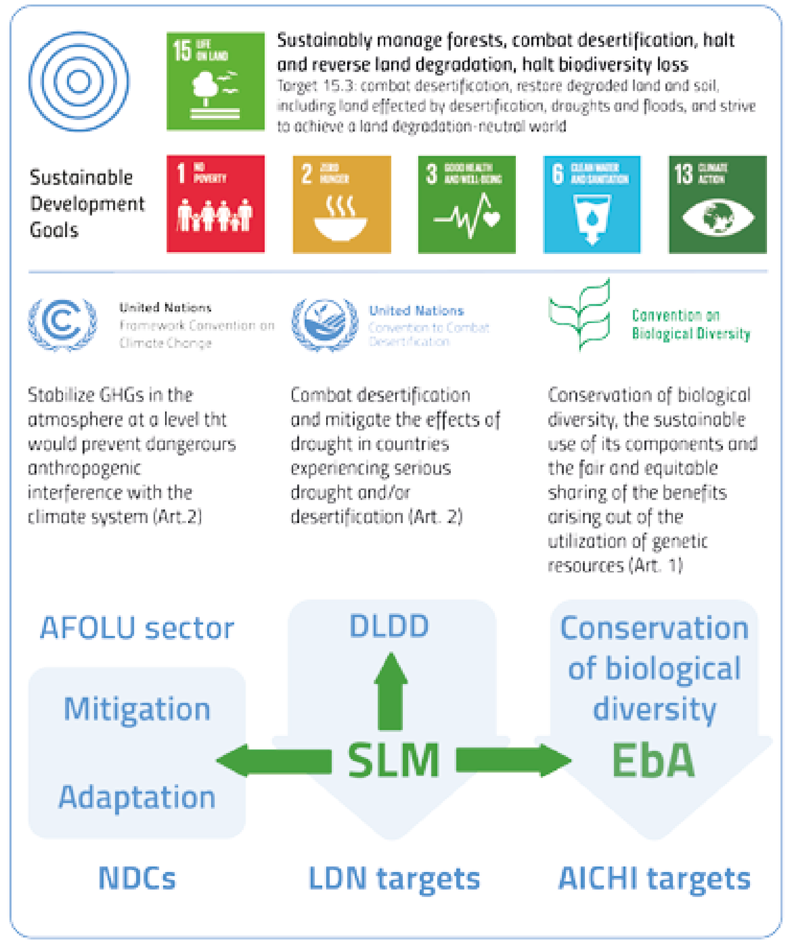

Figure 2: SLM to support the objectives of the three Rio Conventions at the nexus of several SDGs
AFOLU: Agriculture, Forestry and Other Land Use
DLDD: Desertification, Land Degradation, and Drought
EbA: Ecosystem-based Adaptation
LDN: Land Degradation Neutrality
NDCs: Nationally Determined Contributions

What is Sustainable Land Management (SLM)?

SLM was defined at the Rio Earth Summit in 1992 as "the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions". The concept of SLM is applicable to any ecosystem and land-use type and is particularly relevant to address DLDD, climate change adaptation and mitigation in the Drylands. SLM represents a wide range of agronomic, vegetative, management and structural technologies, policies and activities in agricultural and (semi)natural land, based on the key principles of maintaining and enhancing the productivity and protection of natural resources, while being economically viable and socially acceptable. The potential benefits provided by SLM practices are widely accepted and documented within the scientific community based on site-specific research. SLM forms one of the main mechanisms to achieve Land Degradation Neutrality (LDN).

Sustainable Land Management solutions

Both the **design** and the **benefits** of SLM practices depend on local environmental, socioeconomic and cultural conditions and trends. Moreover, decision-making on SLM needs to consider all possible synergies and trade-offs across spatial and temporal scales. There are, therefore, no one-size-fits-all solutions to SLM, and we can make few generalizations from the findings of local SLM impact studies because their effectiveness is inherently dependent upon the local context. Nevertheless, there is widespread scientific evidence of the advantages individual SLM practices can have in simultaneously addressing DLDD, climate change adaptation and mitigation, grounded on empirical, site-specific research. Best solutions are often **combinations of SLM practices** that aim to:

- **Increase and stabilise crop productivity** through combinations of vegetation management, crop diversification, soil fertility and sustainable water management practices. Although the adoption of such integrated practices may have a modest impact on climate change mitigation in drylands, they positively contribute to climate change adaptation, water management and addressing DLDD at large, a priority in these regions.
- **Ensure sustainable grazing land management** through combinations of vegetation and livestock management, by incentivizing the use of indigenous species, diversifying and selecting the most appropriate species for particular areas considering their resilience to drought and forecasted climate change, and by managing the timing and severity of grazing to avoid overgrazing and prevent exceeding the carrying capacity.
- **Maintain or increase forest cover** through forest conservation and sustainable forest management, encouraging afforestation and reforestation, while reducing deforestation, in particular in tropical forests. These practices have a strong positive impact upon climate change mitigation and biodiversity preservation while preventing land degradation and increasing the resilience of forest-dependent communities. Protecting and enhancing forest carbon stocks and forest cover with the appropriate mix of species, prioritising the use of indigenous species, in combination with assisted regeneration practices, enables managed and unmanaged forest ecosystems to adapt to extreme events (e.g. heatwaves, droughts, floods, landslides, sand and dust storms), and to pests and diseases.
- **Promote agroforestry and agro-pastoralism practices,** such as plantations of crop combinations under multipurpose tree systems, intercropping with green covers in perennial woody crops and inclusion of livestock. These mixed systems contribute to increased soil quality and carbon sequestration, maintains soil fertility and nutrient cycling, and minimises soil erosion, while providing food and income to local communities and enhancing resilience to climate change.

Initiatives and resources such as the World Overview of Conservation Approaches and Technologies (WOCAT), TerrAfrica, the World Bank sourcebook, and the Voluntary Guidelines for Sustainable Soil Management (VGSSM) provide comprehensive examples of local SLM practices and concepts. The combination of practices that address soil and water conservation, the diversification of cropping systems, the integration of crop and livestock systems, and agroforestry are most effective and should be encouraged. Land users, managers and other stakeholder need to identify local optimal combinations of SLM practices for each land use type (croplands, grazing land, forest/woodland, mixed land, or other land use classes such as mines or settlements). Examples of groups of SLM technologies are: Integrated soil fertility management, Minimum soil disturbance, Soil erosion control, Vegetation management, Water management, Reducing deforestation, and others.

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The pivotal role of soil organic carbon

Maintaining or increasing Soil Organic Carbon (SOC) stocks is a positive consequence of most SLM practices, and provides synergies for addressing DLDD, climate change adaptation and mitigation. Besides contributing to **climate change mitigation** by reducing greenhouse gas (GHG) emissions and removing carbon dioxide (CO_2) from the atmosphere, enhancing SOC improves soil health and fertility through improved water and nutrient retention and availability to plants, and therefore contributes to **food production potential, drought re-silience, climate change adaptation-mitigation** and **biodiversity** **(Figure 3).** Maintaining or increasing SOC to reach the maximum capacity of soils is generally in the interest of land users and society as a whole. However, at present, many of the economic benefits to farmers and society remain largely unquantified and depend on the baseline conditions, local environmental, socio-economic and cultural conditions.

SLM practices have strong potential to maintain or increase SOC stocks. The large-scale implementation of SLM practices in all managed global soils (irrigated and rainfed cropland, grazing lands, forests and woodlands) can theoretically amount to a net annual removal of about 1–2 Gt of CO_2 from the atmosphere over 30–50 years, contributing to offsetting a substantial part of the anthropogenic CO_2 emissions. While in specific cases the net climate change mitigation potential of SLM practices could be constrained by interactions between the carbon and nitrogen cycles, increasing SOC has crucial positive benefits for achieving LDN, climate change adaptation-mitigation, food security and the protection of biodiversity. However, not all SOC is equal: the quality, local climatic conditions, soil properties, and microbial communities determine its functionality.

At any site, the rate of SOC sequestration through SLM practices declines over time. In degraded lands, poor in SOC, SLM must at least prevent further loss of SOC to prevent ecosystem collapse, and where possible capitalize its huge sequestration potential in extensive degraded lands globally. In soils with a high SOC content, preventing SOC loss through SLM is a priority.

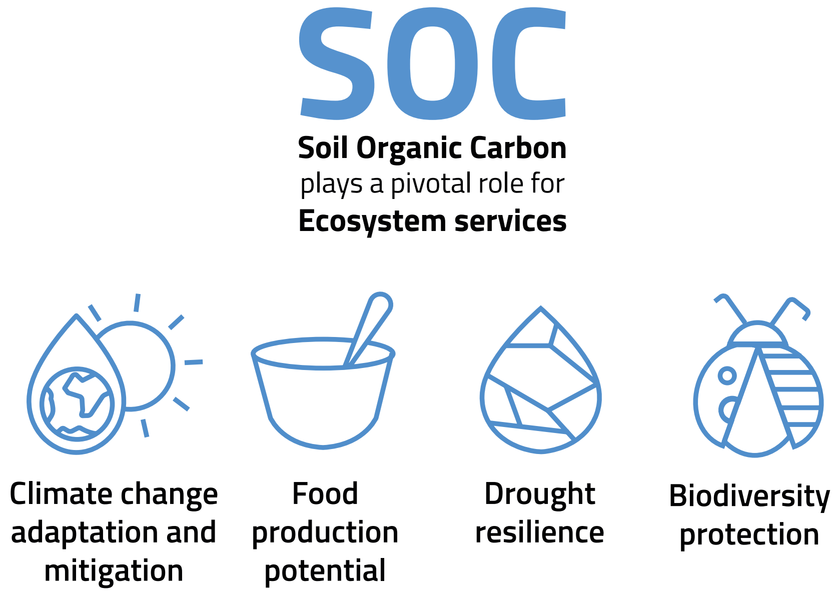

Figure 3: The pivotal role of soil organic carbon for crucial ecosystem services

SLM for the Nationally Determined Contributions (NDCs)

The continuing rise in emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs) is a growing threat for meeting the international goal of limiting warming to less than 2°C in comparison with the preindustrial era. The objective of UNFCCC's Paris Agreement is to strengthen the global response to climate change by keeping a global temperature rise this century well below this 2°C, and to pursue efforts to limit the temperature increase to 1.5°C. Delivering this level of ambition requires immediate and dramatic emission cuts in all sectors. The Agreement establishes a binding obligation to all Parties to put forward NDCs that formulate a country's mitigation strategies and goals. To have more than fifty percent chance of limiting warming below 2°C, most recent scenarios from integrated assessment models require large-scale deployment of *negative emission technologies.* In that context, the land sector has significant mitigation potential through increasing carbon stocks in biomass and soil and reducing GHG emissions, especially in agriculture and forests. SLM could be the basis of well-designed and realistic land based interventions that are essential to materialize this mitigation potential in the context of national and local circumstances and priorities.