Sustainable land management for upscaled climate action

SLM is key to delivering on the NDCs

Soils are vulnerable to climate change. Both drought and heavy rainfall increase the risk of soil erosion, while rising temperature decreases the retention of water by soils and plants. These effects are exacerbated by land degradation, which already affects about 2 billion hectares of land worldwide, or 20% of total vegetated land. By contrast, well managed soils are better able to retain moisture, which is essential to managing the effects of drought and floods. Rising temperatures and changes in precipitation patterns are likely to increase the risk of land degradation, unless measures are taken to protect and restore soils. Land management plays key roles in food provisioning, regulating water cycles and maintaining other ecosystem services. **Sustainable land management (SLM) is thus a key measure in adapting to the effects of climate change.** SLM has benefits not just for land-based sectors, but also for urban, industrial and other sectors that depend on the ecosystem services provided by land resources.

Unsustainable land uses contribute 10-12 $GtCO_2e$ per year, or nearly 25% of global greenhouse gas (GHG) emissions (IPCC 2014). About half of this is due to agriculture. The amount of carbon stored in the world's soils is bigger than the carbon in all vegetation and the atmosphere combined. With proper management, **soils and vegetation can sequester carbon, and contribute to mitigating further climate change**. Carbon sequestration rates vary by SLM practices and agro-ecosystem, but can sequester between 0.1 and 1.14 tCO_2e per hectare per year in soils, and up to 40 tCO_2e in above ground biomass in some agroforestry systems (IPCC 2007, Feliciano et al. 2018).

There is growing evidence worldwide that many SLM measures have simultaneous benefits for climate change mitigation, adaptation and food security, as well as soil protection (see Box 1).
Increasing soil organic carbon (SOC) is key to the benefits of many SLM practices.

SOC formation not only removes atmospheric CO_2, but also improves soil structure, which improves water and nutrient retention, with benefits for plant production and resilience to drought.

The importance of SLM has been recognized in many countries' NDCs submitted to the UNFCCC. Among 167 NDCs submitted to the UNFCCC, two thirds NDCs note the vulnerability of ecosystems to the effects of climate change and a similar proportion recognize that ecosystem protection is a key intended outcome of adaptation (Seddon 2018). SLM measures, including soil and nutrient management in croplands, agroforestry and grazing land management, are listed as **priority actions for climate change mitigation in 60% of all submitted NDCs and for adaptation in 40% of NDCs** (Richards et al. 2016).

Box 1: Adaptation, mitigation and food security benefits of SLM measures

There have been many studies of the effects of specific SLM measures on soil and biomass carbon stocks, hydrology and crop yields. Selected results of a review are summarized in Table 1. More than 1500 SLM practices are documented in the WOCAT Global SLM database along with indicators of their documented effects (https://www.wocat.net/en/global-slm-database).

Because of variation in agroecosystem, climate and other factors, the suitability and benefits of different SLM measures will be site-specific. There may also be trade-offs between different effects. Even in one site, no single measure will be a 'silver bullet' that delivers all kinds of benefits. SLM measures are often promoted as packages and as part of broader watershed management or agricultural development programmes.

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Table 1: Co-benefits of selected SLM measures
(1: low or none, 2: moderate, 3: high)

SLM measure	Soil carbon sequestration	Soil water retention	Crop yield
Targeted fertilizer placement	2	3	3
Mulching	3	2	2
No-till technology	2	3	2
Gully control	2	1	2
Vegetated terraces	3	2	2
Permanent soil cover	3	1	2
Grow perennial grass	3	2	2
Rangeland resting	2	1	2
Assisted forest regeneration	3	1	2
Agroforestry buffer zones	3	2	2
Integrated tree-fodder-animal systems	3	3	2

Adapted from Sanz et al. 2017

Box 2: Climate benefits of SLM programmes in Ethiopia

Ethiopia is implementing SLM at scale within the SLM programme and the Productive Safety Net Programme (PSNP), which aims to increase long-term resilience to food shortages by supporting the rural poor to create assets and become food sufficient. Cash and food transfers are given to those in need. In return, able bodied beneficiaries provide labour for public works, including building soil and water conservation structures, planting shrubs and trees, and building community infrastructure. The PSNP covers 56% of the 670 rural districts in the country.

Studies have reported reduced soil erosion, increased ground and surface water flows, improved biodiversity and benefits for livelihoods. A recent assessment estimated the carbon benefits of the PSNP at about 3.4 ± 0.7 million tCO_2e per year, roughly equivalent to 1.5% of the emission reductions targeted in Ethiopia's NDC. Of this total, biomass and SOC accounted for about 40% each, with the remainder due to improved livestock management.

Ethiopia is also implementing the Sustainable Land Management Programme (SLMP), which targets more productive areas than the PSNP. GIZ and KfW work together in support of the SLMP. GIZ is providing advisory services to improve the legal framework for SLM and to strengthen capacities of the agricultural extension services. KfW provides funding for investments on SLM measures such as erosion gullies and terracing in SLMP watersheds, and for improving agricultural productivity. More than 190,000 households have been supported to adopt SLM measures on more than 180,000 ha of formerly degraded land.

Sources: WFP 2012, GIZ 2014a

Scaling up SLM for climate action through climate finance

Achieving widescale adoption of SLM requires that technical, socio-economic, institutional and political dimensions of preventing land degradation and restoring degraded lands are addressed. Many countries have SLM policies and programmes, and SLM measures are often incorporated into policies and programmes on food security, agricultural development and drought, water and forest management (Box 2). In the framework of UNCCD's Land Degradation Neutrality (LDN) goal, more than 120 countries are engaging in LDN target setting. Strengthening coordination between ministries and integration of land management into national and regional development planning are common challenges. Most countries that prioritize SLM measures in their NDCs have yet to set related targets and elaborate NDC implementation plans (Seddon 2018). There are clear roles for development cooperation in supporting target setting, alignment between sectors, and design of effective interventions (see Box 3).

Box 3: Dimensions of soil protection in German development cooperation

The soil protection programme supported by BMZ through the special initiative One World No Hunger focuses on four dimensions:

1) Ecological: Technical measures and packages of measures must be appropriate to environmental conditions
2) Economic: Farmers and businesses must have incentives for sustainable land management, including land rights
3) Social: All relevant stakeholders – including women – should be involved
4) Political: Engaging stakeholders in policy processes and strengthening supporting institutions.

Source: BMZ 2014

Given the key role of SLM in climate change mitigation and adaptation, there are also **opportunities for increasing the role of climate finance in supporting achievement of the NDCs through SLM**. The main sources of climate finance investments in SLM are the GEF, Adaptation Fund, and more recently the GCF (Box 4). Other funds supporting investments in SLM include the NAMA Facility, the International Climate Initiative and the Nordic Climate Facility.

To date, **agriculture accounts for a very small proportion of climate finance, lagging behind other sectors such as energy**. In 2015-2016, public finance investment in land use mitigation was limited to US$3 billion, and US$4 billion was invested in land use adaptation projects (CPI 2017). By comparison, approximately US$73 billion was spent on energy efficiency and renewable energy. Barriers identified include low risk-adjusted returns in agriculture compared to other sectors, limited capacities for identifying financial needs, and difficulties in measuring the climate impacts of agriculture interventions (World Bank 2016). These constraints often apply also to SLM. However, some lessons can be learned from those projects that have received climate finance support from the GCF and other funds.

Box 4: The Green Climate Fund (GCF)

GCF is the largest public climate financing mechanism. It aims to support a paradigm shift to low-emission and climate-resilient development. Since 2015, US$4.6 billion has been committed to 93 projects, supporting 217 million beneficiaries and avoiding 1.3 billion tCO_2eq of emissions (GCF 2018). Nearly 60% of finance provided by the GCF has been provided to the public sector and 40% to the private sector.

The land use sector is reflected within GCF´s 8 core results areas. For mitigation, the Fund aims to reduce emissions from land use, deforestation, forest degradation and by supporting sustainable forest management and conservation and enhancement of forest carbon stocks. In terms of adaptation, the most direct results areas focus on ecosystems and ecosystem services, health food and water security, which also have strong synergies with SLM. The GCF has approved 38 land use projects, some of which also include SLM measures.

Lessons from existing projects: While there are very few climate finance projects dedicated to SLM, several projects promoting low-emission, climate resilient agriculture do include an SLM component or SLM measures. SLM measures are also incorporated in a number of adaptation projects focusing on managing water risks related to climate change. SLM is thus embedded in projects with a wider scope, where SLM plays key roles in addressing climate vulnerabilities and/or agricultural development constraints. Embedding SLM in this way enables projects to also address economic dimensions (e.g. agri-value chain development) and strengthen the institutional environment (e.g. land use planning, extension services).

Among existing SLM-related climate finance projects, two broad types can be distinguished:

- Development assistance projects, which focus on delivering advisory services for planning and technical extension, strengthening institutions and developing policies. Subsidies for adoption are the most common form of incentive for land users. Climate finance is mostly grants, and co-finance is provided through national funds or other donor funds.
- Financial assistance projects, in which a fund provides loans or loan guarantees to the private sector (e.g. small and medium enterprises) to implement SLM alongside other value chain development activities. Climate finance may be used to either provide foundational equity in the fund, or to underwrite investment risks in order to leverage additional investment into the fund from public and private sources (see Box 5).

Box 5: A GCF-supported risk sharing facility to leverage investment in sustainable agriculture

The GCF is co-financing the Climate Smart Agriculture Risk Sharing Facility in Guatemala and Mexico. Small and medium enterprises wishing to adopt or scale-up climate smart approaches, including SLM measures, find difficulty in accessing finance because financial intermediaries do not offer products tailored to their needs. The Risk Sharing Facility uses loans and grants from the Inter-American Development Bank (IDB) together with loans, equity and guarantees from the GCF to leverage longer-term investment by companies, financial institutions and equity funds in scaling up sustainable practices in small and medium enterprises' supply chains.

Source: GCF 2017

Both types of project may meet the assessment criteria for public sources of climate finance in different ways (Table 2).

National ownership: Projects supporting policies and plans aligned with a country's NDC and sector or regional development or adaptation plans can demonstrate national ownership. **Many sources of climate finance also aim to support transformational change**. This, and related terms, such as paradigm shift, that are widely used in climate finance, are not well defined, but refer to change in the fundamental systems that drive GHG emission pathways or climate vulnerability (GIZ 2014b). For SLM, this may involve interventions that change policy frameworks, provide new capacities or incentives for behaviour change, or that have large impacts beyond the project scope. Multi-dimensional approaches to SLM embedded in broader agricultural development or adaptation initiatives may align well with this requirement.

Table 2. Assessment criteria for climate finance

Level of ambition	National ownership
• GHG impact potential and/or adaptation impacts • Transformational change	• Initiatives align with national policy priorities • Support from national focal points • National key agencies are partners
Financial viability	**Monitoring & measurement**
• Financially viable interventions • Financial management capacity • Leverage of other funds	• A clear monitoring system • Monitoring of adaptation and other benefits • Robust GHG quantification

Financial viability: **Climate funds often require that significant co-financing is leveraged through their investment.** Moreover, since climate funds, such as the GCF, are required to ensure return to the fund for long-term sustainability, grants are less preferred than loans or guarantees, which can be repaid. Co-finance from national or donor funds, such as is common in development assistance projects, may be suitable where the business case for adopting SLM is limited or where transformational change requires significant investment in creating the enabling environment for SLM, such as property rights reforms.

However, there are also many situations where **investment in SLM could be leveraged through investments in partnership with the private sector**. And public funds can complement climate finance in enabling private sector investment. **Investing in SLM is essential for the private sector to sustain and expand production levels**, while managing risks and creating shared value along the value chain up-to the consumer (ELD 2013).

Climate finance can be used to overcome investment barriers in the agriculture sector. In addition to high front-loaded investment costs and back-loaded financial returns on investment, farmers and companies often face technical, social and regulatory risks that decrease the expected returns on investment. Often operating in marginal already degraded lands, there are technical knowledge gaps about how to restore degraded lands, yet research and development investments yield uncertain returns. In particular, family farms and small business often need support to develop viable business models, and to turn them into bankable projects. The financial sector also need support in designing financial products that consider the characteristics of producers' financial flows, and may require support from the public sector to understand and manage risks associated with lending to land-based sectors.

Both technical and financial cooperation are thus complementary to the range of modalities in use by public climate finance and can support leveraging other sources of public and private climate finance to upscale investments in SLM. In each specific context, it will be necessary to better understand the barriers and opportunities for private sector investment in SLM, and to further clarify the respective roles of public funds and climate finance in providing incentives for upscaled adoption of SLM.

Monitoring and measurement: Ultimately, **climate finance must be justified by demonstrated effects on GHG emissions and/or adaptation to climate change**. Perceived difficulties in measuring the effects of land-based interventions on GHG emissions and on adaptation by farmers constitute another barrier to upscaling SLM for climate action. In many developing countries, national GHG inventories that will be used to track performance against NDC targets do not report changes in SOC stocks, or lack sources of data on land management activities affecting SOC stocks that can accurately track change over time. Many SLM projects do collect data on adoption of SLM practices, but not always in ways that are easily converted into mitigation outcomes. Some effective methods have been demonstrated, as described in the brief on Monitoring Climate Benefits of SLM, but so far only at the project level with limited links to national reporting frameworks.

For adaptation, there are often overlaps between the data collected by SLM initiatives and output indicators required for national adaptation reporting or climate finance. For example, numbers of hectares under improved management, numbers of farmers adopting improved practices and crop yield increases are common indicators. However, national adaptation monitoring often focuses on indicators of adaptation outcomes for households and communities that are not often tracked by SLM initiatives. A stakeholder-driven process for improving the coherence of M&E systems serving different needs at local and international levels is described in the brief on Monitoring Climate Benefits of SLM.

Positioning SLM to support upscaled climate action

While the key roles of soil and land management in climate change mitigation and adaptation are clear, several key actions will be needed to realise the potential of SLM to support climate action.

Although a significant proportion of NDCs prioritize SLM measures, many countries have still to refine NDC implementation plans and specific targets for SLM. This process will need to **strengthen alignment between NDCs and the targets and plans in economic development, agriculture and other land-based sectors** (such as LDN and Forest and Landscape Restoration Targets).

To further promote the role of SLM in climate action to achieve NDC targets, it will often be necessary to situate SLM more clearly within agricultural development and ecosystem management initiatives. In particular, this will require closer communication and collaboration between environment and agriculture communities.

Designing the financial and institutional mechanisms to upscale SLM adoption – including through climate finance – will require a better understanding of the barriers and opportunities for investment faced by the private sector. This would not only better position SLM to leverage climate finance for transformative action, but also leverage private sector investment.

SLM initiatives need to demonstrate how their results contribute both to mitigation and to adaptation. A process that engage stakeholders in developing a SLM action plan with coherent M&E systems among stakeholders and across levels can increase the effectiveness of SLM actions with priority outcomes.

This is not a challenge for SLM alone, but also affects other sectors in the context of climate change. Greater coherence between national, sectoral and project-based M&E will be needed.

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