Working Paper

How can smallholder farmers benefit from soil carbon initiatives? Lessons from REDD+

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How can smallholder farmers benefit from soil carbon initiatives? Lessons from REDD+

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KEY MESSAGES

1. Securing tenure is among the most important and challenging tasks for carbon offset schemes. Transparency and enforcement of land rights can help prevent the privatisation of community-owned resources triggered by the commodification of carbon. All forms of land rights must be clear and secure to ensure that women and other disadvantaged groups benefit from carbon offset payments.

2. Legitimacy, and full and effective participation by local communities, reduce the risks of negative impacts and increase the likelihood of social benefits. Where farmers are actively involved from the outset of project design they are far more likely to be motivated to sustain carbon-enhancing practices.

3. Local organisations can act as primary stakeholders to help ensure positive project outcomes but must be supported in terms of capacity development and technology advancement. Local organisations bring together various actors, manage diverging interests, and work towards shared goals.

4. Factors such as gender, age, education, wealth, affect people's social status, and tenure to participate in, and benefit from, carbon projects. Flexible approaches that base payments not only on land ownership and performance indicators, but also on social factors, can support the participation by women and other vulnerable groups.

5. Given the low return on carbon payments, non-carbon benefits are also needed to compensate local resource users for opportunity costs they incur during the project. Non-carbon benefits are the main driver of participation for many, and most crucial to avoid reverting to unsustainable practices.

List of acronyms

CER	Certified emissions reductions
COP	Conference of the Parties
DRC	Democratic Republic of the Congo
FPIC	Free, prior, and informed consent
GHG	Greenhouse gases
Gt	Gigatonne
IPLC	Indigenous peoples and local communities
MRV	Measurement, reporting and verification
NGO	Non-governmental organisation
PES	Payments for ecosystem services
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (UN-led mitigation programme)
RothC	Rothamsted carbon model (for measuring the turnover of organic carbon in topsoil)
SIS	Safeguard information system (tool or database that provides country-level information on how safeguards are being addressed by forest carbon projects)
SLM	Sustainable land management
SOC	Soil organic carbon
UNFCCC	United Nations Framework Convention on Climate Change

This paper was produced as part of the SEWOH Lab. The SEWOH Lab (2020-2025) is an action-oriented research project that is part of the "ONE WORLD ⊣– no Hunger" initiative by the German Federal Ministry for Economic Cooperation and Development. Together with partners in Africa and India, the SEWOH Lab explores, applies, and evaluates the potential of digital innovation in three key areas: urban food systems; sustainable land management for soil organic carbon (SOC) sequestration; and gendered access to natural resources.

Looking beyond climate change mitigation, our work on SOC is dedicated to identifying how such initiatives can enhance food security, livelihoods, biodiversity, and climate adaptation. We investigate the challenges involved in operationalising carbon sequestration projects, explore social and technical innovations that can enhance the benefits of such schemes for smallholder farmers, and look for ways to limit transaction costs.

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1 Introduction

The role of forests in climate change mitigation is widely recognised and has gained political traction since the emergence of the UN mechanism on Reducing Emissions from Deforestation and Forest Degradation (REDD+). In 2005, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) devised REDD+ as a global mechanism to incentivise forest protection and sustainable forest management in order to protect and enhance forest carbon stocks. Since then, numerous REDD+ projects have been designed and implemented, the majority of them in tropical forest-rich countries (Pistorius, 2012).[1]

The largest yet often forgotten terrestrial carbon stock is found right under our feet. The carbon stored in soils is estimated to be about three to four times that stored in vegetation (Bispo et al., 2017). Between 3.4 and 5 Gt carbon dioxide is sequestered annually in soils (Smith et al. 2020). Nonetheless, the exact measurement of carbon in soils is complex (Bispo et al., 2017; Smith et al., 2020). Hence, soil organic carbon (SOC) offset schemes have only emerged recently.

While the demand for carbon credits is steadily growing, soil carbon offset schemes still occupy a small niche in international carbon sequestration schemes. The knowledge base on the biophysical mitigation potential of soils is growing (Bispo et al. 2017, Smith et al. 2019), yet several core challenges remain in relation to project design and implementation. One relates to accuracy, permanence and leakage in carbon accounting (Dynarski et al., 2020; Jacobs et al., 2020; Nottingham et al., 2020), another to implementation at large scale (Amundson & Biardeau, 2018) in order to achieve significant impact. Besides tackling these technical issues, soil carbon initiatives must provide demonstrable added value for those who implement them on the ground, usually farmers. However, climate change mitigation is not a priority for many farmers. Especially smallholders in poorer economies tend to prioritise immediate livelihood benefits (Jerneck & Olsson, 2013). While enhancing SOC yields multiple benefits in terms of long-term food security, climate adaptation, land restoration, and water preservation, SOC projects must also benefit smallholder farmers in the short term.

This paper aims to contribute to emerging debates on soil carbon sequestration by investigating the conditions required to deliver multiple benefits for smallholder farmers. We argue that there are many parallels with, and opportunities to learn from, the long-standing REDD+ mechanism. Our analysis draws on a literature review of scientific articles and reports assessing the past ten years of REDD+ implementation. With a focus on local land users, we address issues of local governance such as land tenure, legitimacy and participation, local support organisations, social inclusion, and non-carbon benefits.

We begin by briefly discussing the concept of payments for ecosystem services (PES) before outlining the contrasts and similarities between REDD+ and SOC initiatives. In the main section, we identify important lessons from REDD+ for SOC projects. We focus on practical insights related to the implementation of projects with smallholder farmers, thereby leaving technical monitoring and overarching market-related questions for further studies.

1 See also: http://www.reddprojectsdatabase.org

2 Setting the Scene: REDD+ and SOC schemes as payments for ecosystem services

Healthy ecosystems are vital to human wellbeing, providing numerous tangible and intangible services such as clean water, food and fibre, and recreation. Payments for ecosystem services (PES) schemes were conceived to address the degradation of ecosystems and the loss of the services they provide. These schemes reward landowners and other resource users for behaviour that maintains or enhances the ecosystem (Wunder & Wertz-Kanounnikoff, 2009). PES schemes are market-based instruments that incentivise ecosystem conservation and restoration (Angelsen et al., 2018; Jack et al., 2008; Milder et al., 2010). Unlike "command-and-control" conservation policies, such as protected area designation and strict environmental laws, PES schemes promote positive behavioural change by offering monetary and non-monetary incentives (Wunder, 2013).

PES schemes have been used to support water supply, carbon sequestration, and biodiversity conservation (Salzman et al., 2018). The agricultural sector offers a genuine entry point for PES, since farming practices critically influence ecosystem functions and thus directly affect the provision of ecosystem services, for instance quantity and quality of surface and groundwater, and the extent of forest cover. SOC sequestration in agriculture is a clear example of an ecosystem service with global benefits. Increasing SOC content improves soil health and farm productivity and contributes to climate change mitigation and adaptation (Farley & Costanza, 2010).

Many studies have investigated the role (and risks) of PES in sustainable development (Blundo-Canto et al., 2018), and the extent to which they can enhance livelihoods for local communities (Blundo-Canto et al., 2018; Dang et al., 2020). There is increasing evidence that PES schemes, under certain conditions, positively contribute to livelihoods in farming communities (Ingram et al., 2014), but they also carry risks and can undermine long-term conservation and pro-environmental behaviours (Chervier et al., 2019; Rode et al., 2015). Unintended negative consequences range from land tenure concerns and "green-grabbing" to negative effects on local biodiversity and further impoverishment of local communities (Samii et al., 2014). Consequently, critics of PES schemes have pointed to the need for more stringent safeguards for resource rights holders, and to the related issues of equity and justice (Van Hecken et al., 2018). Moreover, evaluations must consider not only income-related impacts but also social and cultural impacts and recognise the trade-offs between multiple livelihood dimensions and effects on inequality (Blundo-Canto et al., 2018). PES schemes cannot be analysed purely on the basis of economic incentives; they require a more pragmatic view focusing on local governance, benefit-sharing, and the development pathways and situated agency of beneficiary actors (Jack et al., 2008; Samii et al., 2014; Shapiro¬ Garza et al., 2020).

Table 1. Overview of some key key differences between REDD+ and SOC

	REDD+	SOC
Restoration/ conservation activities	Reduced deforestation, conservation, reforestation, afforestation, agroforestry	Adoption of sustainable land management (SLM) practices by farmers and pastoralists
Measurement, reporting and verification (MRV)	Avoidance of deforestation and forest degradation and sequestration of carbon in forests MRV systems can include remote sensing technologies, national forestry inventories containing agricultural and climate data, project registries, GHG inventories, satellite images, etc.	Carbon stock changes in soils MRV systems can include soil sampling combined with modelling (e.g., RothC), activity-based estimations using regional or country-specific default values, satellite imagery, or a combination of the two systems
Safeguards	Safeguarding system (Cancun safeguards) established during UNFCCC COP16, managed through country-level Safeguard Information System (SIS) and private standards (e.g., Plan Vivo)	Principles and requirements outlined in carbon accounting standard documentation, high degree of flexibility and discretion in terms of operationalisation and enforcement

This paper relies on this conceptualisation of PES schemes in the analysis of REDD+ to inform the design and implementation of SOC projects. Both REDD+ and SOC projects are examples of PES schemes. While both are grounded in a market-based approach to carbon sequestration, there are important differences in terms of key components (see Table 1).

2.1 A brief overview of REDD+

The core concept behind REDD+ is to reward, incentivise and compensate individuals, communities, projects and countries that reduce greenhouse gas (GHG) emissions by protecting forests (Angelsen, 2008). It may be seen as the world's largest PES experiment (Corbera, 2012). Over the last decade, REDD+ has evolved into a complex set of interventions and approaches in relation to land-based ecosystem conservation and the sustainable management of forest carbon stocks (Angelsen, 2017). In addition to reducing GHG emissions, REDD+ is simultaneously expected to deliver non-carbon benefits in the form of biodiversity conservation and improved livelihoods for communities that depend on tropical forests.

To qualify for REDD+ payments, individuals, communities, projects, and countries are required to establish credible deforestation baselines or reference levels against which results can be measured. The calculated carbon emissions that are prevented as a result of the intervention generate carbon credits known as certified emissions reductions (CERs). Demand for CERs stems from a multitude of actors (national and regional governments, development banks, climate funds, companies, and/or individuals).[2]

While REDD+ may not have fulfilled all expectations, the influence it has had on global forest conservation discourses and policies over the past decade or so, have been considerable. Several interim mechanisms and initiatives have been developed to feed the global REDD+ processes with knowledge and practical experiences. These include several multi-donor trust funds, such as the UN REDD Programme (UN REDD), the World Bank Forest Carbon Fund, and the Forest Investment Programme, bilateral agreements between tropical forest countries and donor countries (for instance Norway), and numerous NGOs and private-sector initiatives.

Several challenges accompany REDD+ project development and implementation. These include determining what institutional choice and implementation strategies will be effective and efficient, while also ensuring equitable outcomes. Tackling these questions requires solving issues related to land tenure, securing the rights of indigenous peoples and forest communities, resolving poverty issues (cf. Larson et al., 2013), maintaining the environmental and biodiversity integrities of forest ecosystems (Panfil & Harvey, 2016), and establishing effective and efficient systems for measurement, reporting and verification (MRV) of results from REDD+ (Herold & Skutsch, 2011).

2 Compliance markets are designed to meet a dual objective: to help high-income economies fulfil their commitments to reducing emissions, and to assist low- and middle-income economies in achieving sustainable development. High-income economies can finance initiatives in low- and middle-income economies and/or buy CERs to meet a part of their emission reduction targets under the Kyoto Protocol. Next to compliance markets, the voluntary market encompasses all transactions that are not Kyoto-related, with the demand for carbon offsets driven by companies and individuals that want to take responsibility for offsetting their own emissions.

2.2 A brief overview of SOC offset schemes

Over the past decade, soils have increasingly gained global attention in relation to climate change mitigation and adaptation. Much advocacy by various initiatives (e.g., Global Soil Partnership, Joint Research Soil Atlases, Global Soil Biodiversity Initiative, Global Soil Week, "4p1000" Initiative) pushed soils up on the political agenda. At European level, soils have gained political traction through the recently adopted EU Soil Strategy for 2030, which aims to contribute to climate neutrality, biodiversity protection and healthy food, among other objectives, as well as the implementation of the EU Green Deal.

Nonetheless, the storage of carbon in soils, e.g., through the protection, restoration and sustainable management of wetlands, grasslands, and agricultural lands, has so far been excluded from the regulated emissions trading schemes of the Kyoto Protocol and the Paris Agreement. This may be explained by the complexity and the lack of standardisation in measuring carbon stock changes as well as uncertainty regarding the permanence of carbon sequestration in soils, and the environmental factors that affect the ability of soils to store carbon (Keenor et al., 2021).

In order to ensure permanence of soil carbon sequestration, SOC projects strive to incentivise long-term behavioural change by farmers through the adoption of sustainable land management (SLM) practices such as no-till or reduced tilling, conservation agriculture or mulching harvest residues (Chotte et al., 2019). As within REDD+, rigorous baselines for carbon stocks and appropriate MRV methodologies are crucial to ensure the additionality of the project and the permanence of SOC. However, measuring the amount of carbon sequestered in soils at the scale and accuracy necessary for SOC programs to succeed is a challenging task. The soil carbon accounting methodologies range from direct measurements of soil carbon stock changes based on soil sampling, activity-based estimations using regional or country-specific default values, satellite imagery, and a combination of these. The main challenges in monitoring are to provide robust frameworks that account for variabilities across different agroecological zones and farming systems, while being participatory and cost-effective (Tamba et al., 2021).

Besides issues of accuracy, leakage and permanence, SOC projects face implementation challenges. These include setting up institutional structures to aggregate and work with a large number of farmers (Lee et al., 2016), providing adequate extension services and sufficient non-carbon benefits for farmers' buy-in and continued adoption of SLM practices (Nyberg et al., 2020; Tennigkeit et al., 2013).

3 Lessons from REDD+

In this section we present findings from a short literature review of REDD+ covering the years 2010 to 2021. Based on this review, we identify lessons from REDD+ that can inform SOC initiatives. In particular, we focus on practical insights related to the implementation of projects with smallholder farmers. We do not discuss technical, monitoring, and overarching market-related questions in detail; that will require further study.

3.1 Tenure rights

The evidence shows that clear and secure tenure land rights for indigenous peoples and local communities (IPLC) are a strong enabling factor for forest conservation (Garnett et al., 2018; Robinson et al., 2014). Globally, over 40% of protected land areas and intact landscapes are within IPLC territories (Garnett et al., 2018). Yet, only 10% of these lands are legally recognised (Rights and Resources Initiative, 2017).

Clarifying and securing land tenure remains one of the biggest challenges for REDD+ implementation (Paudel et al., 2015; W. D. Sunderlin et al., 2018). It is critical to determine the distribution of benefits, and enhance incentives for forest protection (S. Chomba et al., 2016). In many tropical forests, customary and statutory tenure and governance systems exist in parallel and sometimes in competition, complicating the distribution of benefits from REDD+ or other PES schemes to land and resource users (Samndong & Vatn, 2018). Accordingly, the recognition of customary tenure rights is incorporated in safeguards such as the Plan Vivo standard.[3] Yet, recent research across countries has shown that legal ownership of carbon rights (the right to sell), the right to manage, and the right to decide on what is being produced do not necessarily overlap, making the attribution of carbon rights more complex (Streck, 2020).

Secure collective tenure is particularly important in REDD+ projects that seeks to promote custodianship of forests by local people. In fact, PES schemes such as REDD+ have the opportunity to provide context-specific approaches to recognise customary rights of IPCL, compared to forest policies that seek to exclude people from protected forest areas (Awono et al., 2014). In a case study of four REDD+ project sites in the Brazilian Amazon, Duchelle and colleagues found that REDD+ was helping to secure land tenure for smallholder farmers. Depending on the local tenure systems, approaches included georeferencing and demarcation of customary land rights, registering smallholder properties, and developing digital maps (Duchelle et al., 2014). However, the researchers also observed challenges, since the securing of land tenure for local communities ultimately depends on state actors (ibid., 2014).

Tenure rights for IPLC are fundamental in ensuring twwheir ability to benefit from REDD+ projects (S. Chomba et al., 2016; Wunder et al., 2020). However, many observers argue that it is not be enough to merely clarify land tenure rights; these must be transparent and enforced in order to ensure accountability (Ribot & Larson, 2012). The oversight role of other stakeholders, including donors and civil society organisations, has been highlighted as an essential element in ensuring that REDD+ projects do not

3 The Plan Vivo Standard, developed and overseen by the Plan Vivo Foundation in Spain, provides a support framework for smallholders and rural communities, mainly in the developing world, to manage their natural resources more sustainably.

lead to centralised forest governance that excludes local stakeholders from benefits and undermines their traditional rights (Larson et al., 2013).

What are the risks?

In the absence of robust land governance frameworks, the commodification of carbon – and the associated rise in land values – can create incentives for vested interests to privatise community-owned resources. This can further aggravate local power asymmetries, potentially excluding marginalised groups – including tenant farmers, landless people, and women and youth – from the benefits of sequestration projects. For example, in their study of REDD+ design and implementation in Ghana and Nigeria, Asiyanbi et al. (2017) found cases where, through REDD+ processes, local administrations were using existing legal instruments or institutions to assert control over land use and carbon sales at the expense of community tenure rights. In the DRC, the government adjudicates carbon rights by applying similar legal provisions to those used for managing forest concessions. Carbon rights agreements are thus signed between private companies and local forest dwellers. These agreements include an obligation for the companies to negotiate social agreements to deliver benefits to local communities, which has proven very challenging (Nhantumbo & Samndong, 2013). Other researchers found that a neglect of historical tenure arrangements strengthened existing inequities (S. Chomba et al., 2016).

Implications for SOC initiatives

Land tenure security is also highly relevant to agricultural carbon projects. Various studies have found a positive link between land tenure security and farmers' adoption of SLM practices (cf. Higgins et al., 2018; Ng'ang'a et al., 2019). Farmers who do not fear losing their land are more likely to adopt soil carbon enhancing practices.

The land tenure implications of REDD+ and SOC projects vary considerably. While REDD+ projects primarily cover large forest areas, SOC projects tend to focus on interventions at the individual farm level are substantially smaller in area than REDD+ projects. Many carbon accounting procedures in SOC projects are therefore based on individual land holdings, which may facilitate the attribution of resource rights, compared to contexts characterised by publicly owned but community-controlled or collectively owned forest land. Nevertheless, many SOC projects face similar challenges in dealing with pluralistic land tenure systems that rely on formal and customary land governance systems operating in parallel. Moreover, despite the existence of land title deeds, control over the use and management of land often lies in the hand of the (male) head of household, thus excluding women and youth, as Musangi (2017) found in Kenya. A neglect of local tenure agreements may exacerbate inequalities and further include vulnerable groups with little control over tenure (Samndong & Vatn, 2018).

With SOC projects it is equally important to understand the dynamics of local tenure systems, including secondary (non-ownership) rights such as access, use and cultivation rights, which are often held by women, youth and migrants. Local solutions that strengthen land use rights, such as formalising land leasing (Kiragu-Wissler et al., 2019) and clarifying intra-household tenure arrangements to the

benefit of women (Stiem-Bhatia & Koudougou, 2018) can ensure that more farmers benefit from project activities.

When land rights are disputed or unclear, SOC projects can learn from the REDD+ experience, as shown by Duchelle and colleagues in the Brazilian Amazon (Duchelle et al., 2014), and play a role in facilitating the clarification and recognition of land tenure. It is important that tenure questions are addressed right from the inception of SOC projects to avoid potential problems – and an increase in transaction costs – in the implementation phase.

Farmer transferring permanent land use rights to his wife based on a model developed by burkinabé NGO GRAF with support by TMG Research in Burkina Faso." © S. Koudougou/ GRAF

3.2 Local legitimacy and participation

Fostering legitimacy, and full and effective participation, in PES schemes is critical for achieving positive outcomes and avoiding potentially negative effects. Legitimacy, understood as the acceptance and justification of shared rules by a community (Vatn, 2015), is particularly important because actions on the ground to reduce deforestation and forest degradation must be taken by local communities. Free, prior, and informed consent (FPIC) has been identified as a 'best practice' for guaranteeing local legitimacy and engagement in REDD+ projects (Sills et al., 2014). The FPIC criteria demands that communities give their consent to REDD+ projects without coercion, intimidation, or manipulation, and with access to necessary and vital information, before the commencement of project activities.

Participation is an important safeguard in and of itself, and it is a cornerstone of indigenous and local people's rights. From a pragmatic perspective, participation reduces the risk of potentially negative impacts of REDD+, and increases the likelihood of enhanced social benefits (Nantongo et al., 2019). Moreover, community participation in REDD+ projects correlate with increases in benefits and incentives for forest management (Awung & Marchant, 2020). REDD+ projects that take into account how certain social groups are included in or excluded from local decision-making processes have been associated with greater local recognition and legitimacy (Setyowati, 2020).

What are the risks?

A lack of legitimacy in project implementation, and disparities in the decision-making power of diverse social groups, can cause problems at several levels. Failure to ensure that communities participate 'fully and effectively' increases the risk of being manipulated and marginalised by REDD+ project development and implementation, and it reduces the likelihood of benefits reaching communities (Krause et al., 2013; Lawlor et al., 2013). Participation should not be seen as an end in itself. It may not lead to empowerment and genuine control if the structures and processes of participation reinforce existing power differentials among the actors (S. Chomba et al., 2016; Nantongo et al., 2019).

Some REDD+ schemes have been criticised for lacking social legitimacy, failing to incorporate diverse perspectives in project design and implementation, and side-lining key actors who could influence land-use dynamics (Corbera & Schroeder, 2017). Given the long time horizon of carbon sequestration projects, failure to develop local ownership erodes motivation to sustain forest conservation or SLM practices. For example, in Tanzania, a decision taken by village leaders without community consent to add another forest area to a REDD+ project led to the enclosure of a forest commons and restricted local access to forest resources, thus undermining local willingness to protect the forest reserve (Scheba & Rakotonarivo, 2016).

Achieving a balance in decision-making power between project developers and communities, but also within communities is important to increase and determine accountability and to ensure that projects are responsive to local needs and interests. For instance, local leaders are more likely to be held accountable if the local community is included in project development and public meetings following the FPIC

principle (Massarella et al., 2018). In addition, when people have access to various sources of information (e.g., flyers and videos in local languages) they are more likely to know about both the benefits and risks of a project,¬ thereby facilitating a balance of power in implementation (Nantongo et al., 2019).

Implications for SOC initiatives

Like REDD+ projects, SOC projects need to consider community organisation and power structures, and address asymmetries hindering the participation of relevant actors and local stakeholders. However, due to their focus on influencing land management for soil carbon storage at the farm level, smallholders need to be involved more directly and derive clear benefits from the implementation of project activities. It is therefore crucial to expand participation to processes through which farmers can influence project design and development from the outset. REDD+ and SOC projects are voluntary and should not be imposed or pursued through coercive means. Although community REDD+ projects are rarely entirely free from manipulation and caoercion (forcing people to refrain from logging or converting forest into agricultural land), SOC projects require voluntary participation (Chomba et al., 2016). Soil carbon sequestration on farms depends on continued changes in management practices as well as repeated land use decisions by individual farmers or farmer groups who use collective grazing lands. Without actively maintaining these activities and ensuring that participants are fully motivated to continue with land management practices these projects will not deliver the desired carbon outcomes.

The REDD+ literature makes several recommendations for fostering genuine, full and effective participation in carbon sequestration projects, including improving implementers' outreach, using participatory resource mapping (Uisso et al., 2021), and providing flexible and continuous support for local communities to develop robust local institutions (Collen et al., 2016). Participatory approaches can address many institutional and project-level challenges, identify and better align the interests of stakeholders, and encourage action to facilitate project development and implementation.

3.3 The role of local organisations

Given the long-term nature of carbon storage, the capacities of local organisations to balance the interests of different stakeholders and reduce transaction costs must be strengthened. Actively involving local people and giving them a leading role in REDD+ projects can increase and maintain motivation to work towards a common objective (Bayrak & Marafa, 2016). Experience from REDD+ pilot projects has shown that with the right capacity development and technology support, community-based organisations and local civil society groups form the ideal organising bodies and normative institutions to deliver positive REDD+ outcomes (Luintel et al., 2013). Recent assessment of countries participating in the World Bank's Forest Carbon Partnership Facility showed that strengthening communal land and forest rights as well as the capacity of IPLC organisations increased the integrity of emissions reductions efforts and the prosperity of these communities (World Bank, 2021).

Previous research on institutional arrangements for REDD+ projects revealed the importance of capacity building for local organisations to play the role of intermediaries between national-level REDD+ policies and initiatives and their local implementation (Luintel et al., 2013; Newton et al., 2015). Local organisations are essential for developing strategies to bring together actors for REDD+ project design, managing interests to define and work towards shared goals, and aligning those goals with national and international forest agendas (Kim et al., 2016).

A central tenet of REDD+ is the establishment of baselines and the measurement, reporting and verification (MRV) capacities that countries and projects need to develop alongside mechanisms to receive and distribute finance leading to lower transaction costs, higher frequency of monitoring, more reliable data such as forest carbon inventories (Danielsen et al., 2011) and more holistic forest management (Gibson et al., 2005).

Implications for SOC initiatives

As with REDD+, supporting and strengthening local expertise can help to ensure the permanence of emission reductions and sequestration in soil management (Tamba et al., 2021). This capacity building can take place at different levels, for instance through local organisations that support farmers and can function in collaboration and via the extension work of those organisations that are already in place. Training farmers in SLM practices reduces costs in the long run, and can also foster knowledge sharing and community building (Lee et al., 2016). Local organisations can also play a crucial role in enhancing farmers' negotiating power (Tamba et al., 2021).

3.4 Equity and social inclusion in benefit sharing

Factors like gender, age, education level, wealth, social and tenure status may affect the likelihood of people participating in, and benefitting from SOC and REDD+ projects (Stiem & Krause, 2016; Tegegne et al., 2021). New vulnerabilities may be created if the question of who has right to the carbon revenues is not addressed (Peskett & Brodnig, 2011). Thus, engaging women and other vulnerable groups is not optional in REDD+ programmes, but a vital enabling factor for project success (Luttrell et al., 2013). Equity and social inclusion in REDD+ projects require that women and vulnerable groups are guaranteed equal chance to participate, actively recruited, trained and/or otherwise supported and that incentives are given to those in greatest need, potentially irrespective of ability to perform or contribute (Chomba, 2015; McDermott et al., 2013).

Some REDD+ pilot projects have adopted flexible approaches to avoid exacerbating existing inequalities and ensure that vulnerable groups benefit. In a REDD+ pilot project in three watersheds in Nepal, REDD+ payments were based not only on performance indicators but also on socio-economic factors. This ensured that disadvantages groups like women, the poor, Dalit and indigenous peoples received a fair share of REDD+ benefits (Shrestha et al., 2014).

What are the risks?

Reviews of REDD+ initiatives have highlighted concerns regarding women's unequal participation and access to benefits. Case study reports

from Tanzania found that – despite numerous interventions to disseminate project information – women and poorer villagers were less well-informed about project activities (Khatun et al., 2017). Even where women's participation in and awareness of REDD+ increased as a result, they were still excluded from participating in project design and implementation (Larson et al., 2018). In the DRC, norms regarding gender roles and women's overall lower levels of education were used to legitimise the hegemonic position of men in forest resource governance (Stiem & Krause 2016).

Implications for SOC initiatives

In order to ensure a gender-sensitive approach, SOC projects must recognise women's agency and the significant contribution they make to agriculture-based livelihoods. A truly gender-sensitive approach includes the removal of gender-specific barriers to the adoption of SLM practices such as insecure land rights for women, restricted access to equipment and farming inputs, and lack of labour (Stiem-Bhatia et al., 2019). Targeted support of women's organisations can be an important factor for positive change and can strengthen women's decision-making power in projects, thus helping to reduce existing gender inequalities (Paradza, 2011). Learning from positive REDD+ experiences, women and landless farmers in SOC projects should not only be compensated based on land ownership but based on their contributions to carbon sequestration. Projects need to pursue practical strategies that fit in with, for example, women's overlapping roles in households, childcare, farming, and community duties (Stiem & Krause, 2016).

3.5 Non-carbon and livelihood benefits

REDD+ projects affect and influence the way Indigenous Peoples, local communities and governments use and manage forests and the associated natural resources necessary for sustaining livelihoods and economic development. For many countries with extensive tropical forests, REDD+ is about more than just carbon, and should therefore provide multiple non-carbon benefits (Duchelle et al., 2018; Katere et al., 2015). These include governance benefits (e.g., strengthening local institutions and developing participatory land-use plans), socio-economic aspects (e.g., creation of additional income-generating activities, poverty reduction, environmental education), and environmental benefits (e.g., land restoration and water conservation) (cf. Uisso et al., 2021).

Participants in a REDD+ project in Tanzania stressed that the most appreciated non-carbon benefits were those that were directly supported by the project, such as the introduction of village community banks and the provision of improved stoves (Uisso et al., 2021). Furthermore, the villagers appreciated the development of participatory land use plans, as these led to better land tenure security (Ibid.).

What are the risks?

Evidence proving that REDD+ delivers socio-economic co-benefits is scarce, and little attention has been given to monitoring non-carbon benefits in REDD + initiatives (Vijge et al., 2016). In many cases, REDD+ projects revealed that the opportunity costs of implementing the activities were higher than the income received through carbon payments, and that participants were not adequately compensated

for these opportunity costs (Duker et al., 2019; Ickowitz et al., 2017; Sunderlin et al., 2018). In many field observations of REDD+ projects, the expectations of local communities that projects would support the creation of alternative livelihood opportunities (e.g., ecotourism, improved agricultural practices and inputs) were not fulfilled (Sunderlin et al., 2017). However, without fair compensation for forest users, pressures on forest resources may actually increase, thereby realising the opposite of what REDD+ seeks to achieve (Duker et al., 2019; Massarella et al., 2018).

Women demonstrating here maize production thanks to better soil management in central Benin. Improving agricultural production through enhancement of soil carbon stocks is an important co-benefit. © L. Stiem-Bhatia/ TMG Research

4 Over the past year, nature-based carbon prices per tCO2 ranged between 5 and 15 USD at the New York Stock Exchange. See here: https://www.tradingview.com/symbols/NYMEX-NGO1!/?utm_source=carboncredits.com&utm_medium=widget&utm_campaign=chart&utm_term=NYMEX%3ANGO1%21

Implications for SOC initiatives

As with forest users, farmers' main priority is generally not climate mitigation but livelihood benefits (Jerneck & Olsson, 2013). Providing farmers with more benefits than carbon payments is especially relevant in SOC schemes that depend on fluctuating carbon prices in the voluntary market. Carbon payments often provide insufficient revenues for farmers who may have to trade-off profitable farm functions to adopt SLM practices (Tennigkeit et al., 2013).[4] Thus, SOC projects need to provide a number of co-benefits to compensate for the opportunity costs that farmers incur when they adopt SLM practices, particularly if the carbon price falls below the opportunity costs. These co-benefits may include access to high-quality extension services, the development of agricultural value chains, improved local governance structures, and biodiversity conservation. Co-benefits such as the development of agricultural value chains can provide livelihood opportunities to resource-poor farmers, like the promotion of the dairy sector from which landless farmers in the Livelihoods Mt Elgon project are expected to benefit. Co-benefits may also increase farmers' motivation to sustain SLM practices over time.

4 Conclusion

Alongside serious and drastic decarbonisation efforts, the protection, restoration and sustainable management of forests and agricultural land remains a widely used instrument for climate mitigation. Beyond carbon sequestration, nature-based carbon schemes have the potential to provide multiple benefits such as improving livelihoods, promoting inclusive resource governance, and protecting biodiversity. An enabling environment that allows smallholder farmers to learn about, take part in, and benefit from the emergence of SOC projects can be built on the insights from REDD+ and other land-based carbon offset initiatives.

Our analysis of lessons learned from SOC initiatives focussed on practical insights related to the implementation of projects with local communities. Based on selected REDD+ evidence gathered over the past decade, we highlight the need to clarify and secure tenure rights, foster local legitimacy and participation, ensure gender equity and social inclusion, strengthen local organisations that can support bottom-up project implementation and monitoring, and foster livelihood opportunities beyond carbon payments.

REDD+ provides valuable insights that can support SOC projects to live up to their stated goals. We hope that the recommendations outlined in this paper can foster learning and exchange between the two communities of practice to make carbon sequestration work for smallholder farmers and local communities. At the national, regional and global levels it will be crucial to integrate REDD+ lessons into policies and standards for SOC schemes. Beyond improving project implementation on the ground, it will also be important to ensure that nature-based carbon initiatives do not lead to a delay in climate action in sectors like energy, industry, transport, and housing.

References

Amundson, R., & Biardeau, L. (2018). Opinion: Soil carbon sequestration is an elusive climate mitigation tool. Proceedings of the National Academy of Sciences, 115(46), 11652–11656. https://doi.org/10.1073/pnas.1815901115

Angelsen, A. (Ed.). (2008). Moving ahead with REDD: Issues, options and implications. Center for International Forestry Research.

Angelsen, A. (2017). REDD+ as Result-based Aid: General Lessons and Bilateral Agreements of Norway. Review of Development Economics, 21(2), 237–264. https://doi.org/10.1111/rode.12271

Angelsen, A., Brockhaus, M., Duchelle, A. E., Larson, A. M., Martius, C., Sunderlin, W. D., & Wunder, S. (2018). Transforming REDD+: Lessons and new directions. Center for International Forestry Research.

Asiyanbi, A., Arhin, A., & Isyaku, U. (2017). REDD+ in West Africa: Politics of Design and Implementation in Ghana and Nigeria. Forests, 8(3), 78. https://doi.org/10.3390/f8030078

Awono, A., Somorin, O. A., Eba'a Atyi, R., & Levang, P. (2014). Tenure and participation in local REDD+ projects: Insights from southern Cameroon. Environmental Science & Policy, 35, 76–86. https://doi.org/10.1016/j.envsci.2013.01.017

Awung, N. S., & Marchant, R. (2020). Transparency in benefit sharing and the influence of community expectations on participation in REDD+ Projects: An example from Mount Cameroon National Park. Ecosystems and People, 16(1), 78–94. https://doi.org/10.1080/26395916.2019.1698658

Bayrak, M., & Marafa, L. (2016). Ten Years of REDD+: A Critical Review of the Impact of REDD+ on Forest-Dependent Communities. Sustainability, 8(7), 620. https://doi.org/10.3390/su8070620

Bispo, A., Andersen, L., Angers, D. A., Bernoux, M., Brossard, M., Cécillon, L., Comans, R. N. J., Harmsen, J., Jonassen, K., Lamé, F., Lhuillery, C., Maly, S., Martin, E., Mcelnea, A. E., Sakai, H., Watabe, Y., & Eglin, T. K. (2017). Accounting for Carbon Stocks in Soils and Measuring GHGs Emission Fluxes from Soils: Do We Have the Necessary Standards? Frontiers in Environmental Science, 5, 41. https://doi.org/10.3389/fenvs.2017.00041

Blundo-Canto, G., Bax, V., Quintero, M., Cruz-Garcia, G. S., Groeneveld, R. A., & Perez-Marulanda, L. (2018). The Different Dimensions of Livelihood Impacts of Payments for Environmental Services (PES) Schemes: A Systematic Review. Ecological Economics, 149, 160–183. https://doi.org/10.1016/j.ecolecon.2018.03.011

Chervier, C., Le Velly, G., & Ezzine-de-Blas, D. (2019). When the Implementation of Payments for Biodiversity Conservation Leads to Motivation Crowding-out: A Case Study From the Cardamoms Forests, Cambodia. Ecological Economics, 156, 499–510. https://doi.org/10.1016/j.ecolecon.2017.03.018

Chomba, S., Kariuki, J., Lund, J. F., & Sinclair, F. (2016). Roots of inequity: How the implementation of REDD+ reinforces past injustices. Land Use Policy, 50, 202–213. https://doi.org/10.1016/j.landusepol.2015.09.021

Chomba, S. W. (2015). Implications of Decentralized Forest Management and REDD+ for Rural Vulnerability in Kenya [Department of Food and Resource Economics, Faculty of Science, University of Copenhagen]. https://www.forskningsdatabasen.dk/en/catalog/2398337848

Chotte, J. L., Aynekulu, A., Cowie, E., Campbell, P., Vlek, R., Lal, R., Kapovic-Solomun, G., von Malitz, G., Kust, G., Barger, N., Vargas, R., & Gastrow, S. (2019). Realising the Carbon Benefits of Sustainable Land Management Practices: Guidelines for Estimation of Soil Organic Carbon in the Context of Land Degradation Neutrality Planning and Monitoring. A report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD).

Collen, W., Krause, T., Mundaca, L., & Nicholas, K. A. (2016). Building local institutions for national conservation programs: Lessons for developing Reducing Emissions from Deforestation and Forest Degradation (REDD+) programs. Ecology and Society, 21(2), art4. https://doi.org/10.5751/ES-08156-210204

Corbera, E. (2012). Problematizing REDD+ as an experiment in payments for ecosystem services. Current Opinion in Environmental Sustainability, 4(6), 612–619. https://doi.org/10.1016/j.cosust.2012.09.010

Corbera, E., & Schroeder, H. (2017). REDD+ Crossroads Post Paris: Politics, Lessons and Interplays. Forests, 8(12), 508. https://doi.org/10.3390/f8120508

Dang, X., Gao, S., Tao, R., Liu, G., Xia, Z., Fan, L., & Bi, W. (2020). Do environmental conservation programs contribute to sustainable livelihoods? Evidence from China's grain-for-green program in

northern Shaanxi province. Science of The Total Environment, 719, 137436. https://doi.org/10.1016/j.scitotenv.2020.137436

Danielsen, F., Skutsch, M., Burgess, N. D., Jensen, P. M., Andrianandrasana, H., Karky, B., Lewis, R., Lovett, J. C., Massao, J., Ngaga, Y., Phartiyal, P., Poulsen, M. K., Singh, S. P., Solis, S., Sørensen, M., Tewari, A., Young, R., & Zahabu, E. (2011). At the heart of REDD+: A role for local people in monitoring forests?: Local REDD+ monitoring: reliability and cost. Conservation Letters, 4(2), 158–167. https://doi.org/10.1111/j.1755-263X.2010.00159.x

Duchelle, A. E., Cromberg, M., Gebara, M. F., Guerra, R., Melo, T., Larson, A., Cronkleton, P., Börner, J., Sills, E., Wunder, S., Bauch, S., May, P., Selaya, G., & Sunderlin, W. D. (2014). Linking Forest Tenure Reform, Environmental Compliance, and Incentives: Lessons from REDD+ Initiatives in the Brazilian Amazon. World Development, 55, 53–67. https://doi.org/10.1016/j.worlddev.2013.01.014

Duchelle, A. E., Simonet, G., Sunderlin, W. D., & Wunder, S. (2018). What is REDD+ achieving on the ground? Current Opinion in Environmental Sustainability, 32, 134–140. https://doi.org/10.1016/j.cosust.2018.07.001

Duker, A. E. C., Tadesse, T. M., Soentoro, T., de Fraiture, C., & Kemerink-Seyoum, J. S. (2019). The implications of ignoring smallholder agriculture in climate-financed forestry projects: Empirical evidence from two REDD+ pilot projects. Climate Policy, 19(sup1), S36–S46. https://doi.org/10.1080/14693062.2018.1532389

Dynarski, K. A., Bossio, D. A., & Scow, K. M. (2020). Dynamic Stability of Soil Carbon: Reassessing the "Permanence" of Soil Carbon Sequestration. Frontiers in Environmental Science, 8, 514701. https://doi.org/10.3389/fenvs.2020.514701

Farley, J., & Costanza, R. (2010). Payments for ecosystem services: From local to global. Ecological Economics, 69(11), 2060–2068. https://doi.org/10.1016/j.ecolecon.2010.06.010

Garnett, S. T., Burgess, N. D., Fa, J. E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C. J., Watson, J. E. M., Zander, K. K., Austin, B., Brondizio, E. S., Collier, N. F., Duncan, T., Ellis, E., Geyle, H., Jackson, M. V., Jonas, H., Malmer, P., McGowan, B., Sivongxay, A., & Leiper, I. (2018). A spatial overview of the global importance of Indigenous lands for conservation. Nature Sustainability, 1(7), 369–374. https://doi.org/10.1038/s41893-018-0100-6

Gibson, C. C., Williams, J. T., & Ostrom, E. (2005). Local Enforcement and Better Forests. World Development, 33(2), 273–284. https://doi.org/10.1016/j.worlddev.2004.07.013

Herold, M., & Skutsch, M. (2011). Monitoring, reporting and verification for national REDD + programmes: Two proposals. Environmental Research Letters, 6(1), 014002. https://doi.org/10.1088/1748-9326/6/1/014002

Higgins, D., Balint, T., Liversage, H., & Winters, P. (2018). Investigating the impacts of increased rural land tenure security: A systematic review of the evidence. Journal of Rural Studies, 61, 34–62. https://doi.org/10.1016/j.jrurstud.2018.05.001

Ickowitz, A., Sills, E., & de Sassi, C. (2017). Estimating Smallholder Opportunity Costs of REDD+: A Pantropical Analysis from Households to Carbon and Back. World Development, 95, 15–26. https://doi.org/10.1016/j.worlddev.2017.02.022

Ingram, J. C., Wilkie, D., Clements, T., McNab, R. B., Nelson, F., Baur, E. H., Sachedina, H. T., Peterson, D. D., & Foley, C. A. H. (2014). Evidence of Payments for Ecosystem Services as a mechanism for supporting biodiversity conservation and rural livelihoods. Ecosystem Services, 7, 10–21. https://doi.org/10.1016/j.ecoser.2013.12.003

Jack, B. K., Kousky, C., & Sims, K. R. E. (2008). Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. Proceedings of the National Academy of Sciences, 105(28), 9465–9470. https://doi.org/10.1073/pnas.0705503104

Jacobs, A., Heidecke, C., & Jumshudzade, Z. (2020). Soil organic carbon certificates—Potential and limitations for private and public climate action. Landbauforschung : Journal of Sustainable and Organic Agricultural Systems, 70(2020)2, 31–35. https://doi.org/10.3220/LBF1605778405000

Jerneck, A., & Olsson, L. (2013). More than trees! Understanding the agroforestry adoption gap in subsistence agriculture: Insights from narrative walks in Kenya. Journal of Rural Studies, 32, 114–125. https://doi.org/10.1016/j.jrurstud.2013.04.004

Katere, Y., Fobisse, K., & Annies, A. (2015). Non-carbon benefits of REDD+: The case for supporting non-carbon benefits in Africa. Climate and Development Knowledge Network and Economic Commission for Africa African Climate Policy Centre.

Keenor, S. G., Rodrigues, A. F., Mao, L., Latawiec, A. E., Harwood, A. R., & Reid, B. J. (2021). Capturing a soil carbon economy. Royal Society Open Science, 8(4), rsos.202305, 202305. https://doi.org/10.1098/rsos.202305

Khatun, K., Corbera, E., & Ball, S. (2017). Fire is REDD+: Offsetting carbon through early burning activities in south-eastern Tanzania. Oryx, 51(1), 43–52. https://doi.org/10.1017/S0030605316000090

Kim, Y.-S., Bae, J. S., Fisher, L. A., Latifah, S., Afifi, M., Lee, S. M., & Kim, I.-A. (2016). Indonesia's Forest Management Units: Effective intermediaries in REDD+ implementation? Forest Policy and Economics, 62, 69–77. https://doi.org/10.1016/j.forpol.2015.09.004

Kiragu-Wissler, S., Patt, N., & Stiem-Bhatia, L. Securing Access to Farm Land through Community-led Lease Agreements: Realizing the SDGs in Western Kenya. IISD SDG Knowledge Hub. http://sdg.iisd.org/commentary/guest-articles/securing-access-to-farm-land-through-community-led-lease-agreements-realizing-the-sdgs-in-western-kenya/

Krause, T., Collen, W., & Nicholas, K. A. (2013). Evaluating Safeguards in a Conservation Incentive Program: Participation, Consent, and Benefit Sharing in Indigenous Communities of the Ecuadorian Amazon. Ecology and Society, 18(4), art1. https://doi.org/10.5751/ES-05733-180401

Larson, A. M., Brockhaus, M., Sunderlin, W. D., Duchelle, A., Babon, A., Dokken, T., Pham, T. T., Resosudarmo, I. A. P., Selaya, G., Awono, A., & Huynh, T.-B. (2013). Land tenure and REDD+: The good, the bad and the ugly. Global Environmental Change, 23(3), 678–689. https://doi.org/10.1016/j.gloenvcha.2013.02.014

Larson, A. M., Solis, D., Duchelle, A. E., Atmadja, S., Resosudarmo, I. A. P., Dokken, T., & Komalasari, M. (2018). Gender lessons for climate initiatives: A comparative study of REDD+ impacts on subjective wellbeing. World Development, 108, 86–102. https://doi.org/10.1016/j.worlddev.2018.02.027

Lawlor, K., Madeira, E., Blockhus, J., & Ganz, D. (2013). Community Participation and Benefits in REDD+: A Review of Initial Outcomes and Lessons. Forests, 4(2), 296–318. https://doi.org/10.3390/f4020296

Lee, J., Ingalls, M., Erickson, J. D., & Wollenberg, E. (2016). Bridging organizations in agricultural carbon markets and poverty alleviation: An analysis of pro-Poor carbon market projects in East Africa. Global Environmental Change, 39, 98–107. https://doi.org/10.1016/j.gloenvcha.2016.04.015

Luintel, H., Silori, C. S., Frick, S., & Poudyal, B. H. (2013). Grassroots Capacity Building for REDD+: Lessons from Nepal. Journal of Forest and Livelihood, 11(2), 1–13. https://doi.org/10.3126/jfl.v11i2.8617

Massarella, K., Sallu, S. M., Ensor, J. E., & Marchant, R. (2018). REDD+, hype, hope and disappointment: The dynamics of expectations in conservation and development pilot projects. World Development, 109, 375–385. https://doi.org/10.1016/j.worlddev.2018.05.006

McDermott, M., Mahanty, S., & Schreckenberg, K. (2013). Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services. Environmental Science & Policy, 33, 416–427. https://doi.org/10.1016/j.envsci.2012.10.006

Milder, J. C., Scherr, S. J., & Bracer, C. (2010). Trends and Future Potential of Payment for Ecosystem Services to Alleviate Rural Poverty in Developing Countries. Ecology and Society, 15(2), art4. https://doi.org/10.5751/ES-03098-150204

Musangi, P. (2017). WOMEN LAND AND PROPERTY RIGHTS IN KENYA. Paper Prepared for Presentation at the "2017 WORLD BANK CONFERENCE ON LAND AND POVERTY", 53(9), 20.

Nantongo, M., Vatn, A., & Vedeld, P. (2019). All that glitters is not gold; Power and participation in processes and structures of implementing REDD+ in Kondoa, Tanzania. Forest Policy and Economics, 100, 44–54. https://doi.org/10.1016/j.forpol.2018.10.011

Newton, P., Schaap, B., Fournier, M., Cornwall, M., Rosenbach, D. W., DeBoer, J., Whittemore, J., Stock, R., Yoders, M., Brodnig, G., & Agrawal, A. (2015). Community forest management and REDD+. Forest Policy and Economics, 56, 27–37. https://doi.org/10.1016/j.forpol.2015.03.008

Ng'ang'a, S. K., Jalang'o, D. A., & Girvetz, E. H. (2019). Soil carbon enhancing practices: A systematic review of barriers and enablers of adoption. SN Applied Sciences, 1(12), 1726. https://doi.org/10.1007/s42452-019-1747-y

Nhantumbo, I., & Samndong, R. (2013). REDD+ and rights: Extending carbon rights in the DRC to climate-regulating services (IIED Briefing). London: International Institute for Environment and Development (IIED). http://pubs.iied.org/17182IIED

Nottingham, A. T., Meir, P., Velasquez, E., & Turner, B. L. (2020). Soil carbon loss by experimental warming in a tropical forest. Nature, 584(7820), 234–237. https://doi.org/10.1038/s41586-020-2566-4

Nyberg, Y., Musee, C., Wachiye, E., Jonsson, M., Wetterlind, J., & Öborn, I. (2020). Effects of Agroforestry and Other Sustainable Practices in the Kenya Agricultural Carbon Project (KACP). Land, 9(10), 389. https://doi.org/10.3390/land9100389

Panfil, S. N., & Harvey, C. A. (2016). REDD+ and Biodiversity Conservation: A Review of the Biodiversity Goals, Monitoring Methods, and Impacts of 80 REDD+ Projects: Biodiversity conservation in REDD+ projects. Conservation Letters, 9(2), 143–150. https://doi.org/10.1111/conl.12188

Paradza. (2011). Securing women's land rights in Eastern Africa. Time for a paradigm shift.

Paudel, N. S., Vedeld, P. O., & Khatri, D. B. (2015). Prospects and challenges of tenure and forest governance reform in the context of REDD+ initiatives in Nepal. Forest Policy and Economics, 52, 1–8. https://doi.org/10.1016/j.forpol.2014.12.009

Peskett, L. and Brodnig, & G. 2. (2011). Carbon rights in REDD+: Exploring the implications for poor and vulnerable people. World Bank and REDD-net.

Pistorius, T. (2012). From RED to REDD+: The evolution of a forest-based mitigation approach for developing countries. Current Opinion in Environmental Sustainability, 4(6), 638–645. https://doi.org/10.1016/j.cosust.2012.07.002

Ribot, J., & Larson, A. M. (2012). Reducing REDD risks: Affirmative policy on an uneven playing field. International Journal of the Commons, 6(2), 233–254.

Rights and Resources Initiative. (2017). Securing Community Land Rights: Priorities & Opportunities to Advance Climate & Sustainable Development Goals. Rights and Resources Initiative. https://doi.org/10.53892/QFUJ1241

Robinson, B. E., Holland, M. B., & Naughton-Treves, L. (2014). Does secure land tenure save forests? A meta-analysis of the relationship between land tenure and tropical deforestation. Global Environmental Change, 29, 281–293. https://doi.org/10.1016/j.gloenvcha.2013.05.012

Rode, J., Gómez-Baggethun, E., & Krause, T. (2015). Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. Ecological Economics, 117, 270–282. https://doi.org/10.1016/j.ecolecon.2014.11.019

Salzman, J., Bennett, G., Carroll, N., Goldstein, A., & Jenkins, M. (2018). The global status and trends of Payments for Ecosystem Services. Nature Sustainability, 1(3), 136–144. https://doi.org/10.1038/s41893-018-0033-0

Samii, C., Lisiecki, M., Kulkarni, P., Paler, L., Chavis, L., Snilstveit, B., Vojtkova, M., & Gallagher, E. (2014). Effects of Payment for Environmental Services (PES) on Deforestation and Poverty in Low and Middle Income Countries: A Systematic Review. Campbell Systematic Reviews, 10(1), 1–95. https://doi.org/10.4073/csr.2014.11

Samndong, R., & Vatn, A. (2018). Competing Tenures: Implications for REDD+ in the Democratic Republic of Congo. Forests, 9(11), 662. https://doi.org/10.3390/f9110662

Scheba, A., & Rakotonarivo, O. S. (2016). Territorialising REDD+: Conflicts over market-based forest conservation in Lindi, Tanzania. Land Use Policy, 57, 625–637. https://doi.org/10.1016/j.landusepol.2016.06.028

Setyowati, A. (2020). Governing the ungovernable: Contesting and reworking REDD+ in Indonesia. Journal of Political Ecology, 27(1). https://doi.org/10.2458/v27i1.23185

Shapiro¬Garza, E., McElwee, P., Hecken, G. V., & Corbera, E. (2020). Beyond Market Logics: Payments for Ecosystem Services as Alternative Development Practices in the Global South. Development and Change, 51(1), 3–25. https://doi.org/10.1111/dech.12546

Shrestha, S., Karky, B., & Karki, S. (2014). Case Study Report: REDD+ Pilot Project in Community Forests in Three Watersheds of Nepal. Forests, 5(10), 2425–2439. https://doi.org/10.3390/f5102425

Sisay, N. H., Teshome, S., & Demel, T. (2015). Non-carbon benefits for effective implementation of REDD+: The case of Bale Mountains Eco-Region, Southeastern Ethiopia. African Journal of Environmental Science and Technology, 9(10), 747–764. https://doi.org/10.5897/AJEST2015.1953

Smith, P., Soussana, J., Angers, D., Schipper, L., Chenu, C., Rasse, D. P., Batjes, N. H., Egmond, F., McNeill, S., Kuhnert, M., Arias¬Navarro, C., Olesen, J. E., Chirinda, N., Fornara, D., Wollenberg, E., Álvaro¬Fuentes, J., Sanz¬Cobena, A., & Klumpp, K. (2020). How to measure, report and verify soil carbon change to realize the potential of soil carbon sequestration for atmospheric greenhouse gas removal. Global Change Biology, 26(1), 219–241. https://doi.org/10.1111/gcb.14815

Stiem, L., & Krause, T. (2016). Exploring the impact of social norms and perceptions on women's participation in customary forest and land governance in the Democratic Republic of Congo—Implications for REDD+. International Forestry Review, 18(1), 110–122. https://doi.org/10.1505/146554816818206113

Stiem-Bhatia, L., & Koudougou, S. (2018). Innovations for women's access to land. Rural 21, 52(3/2018), 3. https://www.rural21.com/fileadmin/downloads/2018/en-03/rural2018_03-S19-21.pdf

Stiem-Bhatia, L., St-Jacques, B., Koudougou, S., & Doubogan, Y. O. (2019). Making Sustainable Land Management Work for Women Smallholders (1st ed.). TMG Research gGmbH. https://doi.org/10.35435/2.2019.1

Streck, C. (2020). Who Owns REDD+? Carbon Markets, Carbon Rights and Entitlements to REDD+ Finance. Forests, 11(9), 959. https://doi.org/10.3390/f11090959

Sunderlin, W. D., de Sassi, C., Sills, E. O., Duchelle, A. E., Larson, A. M., Resosudarmo, I. A. P., Awono, A., Kweka, D. L., & Huynh, T. B. (2018). Creating an appropriate tenure foundation for REDD+: The record to date and prospects for the future. World Development, 106, 376–392. https://doi.org/10.1016/j.worlddev.2018.01.010

Sunderlin, W., de Sassi, C., Ekaputri, A., Light, M., & Pratama, C. (2017). REDD+ Contribution to Well-Being and Income Is Marginal: The Perspective of Local Stakeholders. Forests, 8(4), 125. https://doi.org/10.3390/f8040125

Tamba, Y., Wafula, J., Magaju, C., Aynekulu, E., Winowiecki, L., St-Jacques, B., Stiem-Bhatia, L., Arias-Navarro, C., & World Agroforestry (ICRAF). (2021). A review of the participation of smallholder farmers in land-based carbon payment schemes. TMG Research gGmbH and CIFOR-ICRAF. https://doi.org/10.35435/2.2021.4

Tegegne, Y. T., Palmer, C., Wunder, S., Moustapha, N. M., Fobissie, K., & Moro, E. (2021). REDD+ and equity outcomes: Two cases from Cameroon. Environmental Science & Policy, 124, 324–335. https://doi.org/10.1016/j.envsci.2021.07.003

Tennigkeit, T., Solymosi, K., Seebauer, M., & Lager, B. (2013). Carbon Intensification and Poverty Reduction in Kenya: Lessons from the Kenya Agricultural Carbon Project. Field Actions Science Reports, 9.

Uisso, A. J., Chirwa, P. W., Ackerman, P. A., & Mbwambo, L. (2021). Non-carbon benefits as incentives for participation in REDD + and the role of village participatory land use plans in supporting this: Insights from Kilosa District, Tanzania. Journal of Environmental Planning and Management, 64(6), 1111–1132. https://doi.org/10.1080/09640568.2020.1802239

Van Hecken, G., Kolinjivadi, V., Windey, C., McElwee, P., Shapiro-Garza, E., Huybrechs, F., & Bastiaensen, J. (2018). Silencing Agency in Payments for Ecosystem Services (PES) by Essentializing a Neoliberal 'Monster' Into Being: A Response to Fletcher & Büscher's 'PES Conceit'. Ecological Economics, 144, 314–318. https://doi.org/10.1016/j.ecolecon.2017.10.023

Vijge, M. J., Brockhaus, M., Di Gregorio, M., & Muharrom, E. (2016). Framing national REDD+ benefits, monitoring, governance and finance: A comparative analysis of seven countries. Global Environmental Change, 39, 57–68. https://doi.org/10.1016/j.gloenvcha.2016.04.002

World Bank. (2021). Opportunity Assessment to Strengthen Collective Land Tenure Rights in FCPF Countries. World Bank. https://doi.org/10.1596/36499

Wunder, S. (2013). When payments for environmental services will work for conservation: When PES will work. Conservation Letters, 6(4), 230–237. https://doi.org/10.1111/conl.12034

Wunder, S., Duchelle, A. E., Sassi, C. de, Sills, E. O., Simonet, G., & Sunderlin, W. D. (2020). REDD+ in Theory and Practice: How Lessons From Local Projects Can Inform Jurisdictional Approaches. Frontiers in Forests and Global Change, 3, 11. https://doi.org/10.3389/ffgc.2020.00011

Wunder, S., & Wertz-Kanounnikoff, S. (2009). Payments for Ecosystem Services: A New Way of Conserving Biodiversity in Forests. Journal of Sustainable Forestry, 28(3–5), 576–596. https://doi.org/10.1080/10549810902905669

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