GLO Working paper

Scaling up Sustainable Land Management and Restoration of Degraded Land

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Abstract

With current rates of land degradation reaching ten to twelve million ha per year, there is an urgent need to scale up and out successful, profitable and resource-efficient sustainable land management practices to maintain the health and resilience of the land that humans depend on. As much as 500 million out of two billion ha of degraded land, mainly in developing countries, have restoration potential, offering an immediate target for restoration and rehabilitation initiatives.[1] In the past, piecemeal approaches to achieving sustainable land management have had limited impact. To achieve the ambitious goals of alleviating poverty, securing food and water supplies, and protecting the natural resource base, we need to recognize the inter-connectedness of the factors driving land degradation, so that solutions can be taken to scale, transforming management practices for millions of land users. An analysis of the critical barriers and incentives to achieve scaling up suggests that the most appropriate options should be selected through the involvement of stakeholders at all levels, from local to national and international. New incentives for land managers as well as the public and private sectors are required to achieve a land degradation-neutral world.

1. Introduction

Both developing and developed countries are facing the inter-connected challenges of population growth and migration, climate change, biodiversity loss, and degrading land and water resources. We have entered an era where our thirst for material growth is placing extreme pressures on our land resources, threatening ecosystem collapse.[2]

We need to recognize this inter-connectedness more widely and rapidly to take solutions to scale, transforming land management practices for millions of land users. With current rates of land degradation of as much as ten to twelve million ha per year and the fact that there is a need to increase terrestrial food production by some 70 per cent by 2050 to satisfy demands of a growing population,[3] there is an urgent need to scale up and out successful, profitable

and resource-efficient sustainable land management (SLM) practices to preserve the natural resource base that humans depend on for their survival. As much as 500 million out of two billion ha of degraded land has the potential for restoration – mainly in developing countries.[1] There is increased recognition that both the public and the private sectors need to work together with land users to bring about the transformation in land use and management needed to achieve the goals of land restoration.[4]

There are hundreds of examples of interventions to improve land management and prevent or reverse land degradation at the scale of farms, villages, communities or watersheds.[5] However, our inability to scale out technological, institutional and policy solutions to regional, national and international scales severely restricts our capacity to address the global challenge of preventing and reversing land degradation.[6]

It is now well recognized that the concept of SLM is a unifying theme for global efforts to combat desertification, drought and land degradation, climate change and the loss of biodiversity.[7] SLM combines technologies, policies and practices aimed at integrating socio-economic principles with environmental concerns that maintain or enhance production and ecosystem services, reduce the level of production risks, are economically viable, socially acceptable and protect natural resources.[8]

This working paper examines how SLM can be scaled up and out globally. Scaling up and out generally focuses on "expanding, replicating, adapting and sustaining successful policies, programs or projects in geographic space and over time to reach a greater number of people."[9] Institutional changes – both within donor and development organizations as well as initiated by policy makers – are needed to create an enabling environment that can promote scaling out via the adoption of SLM practices from farmer to farmer, and community to community.[10] First, the key elements that explain how and why SLM policies and practices

are adopted institutionally and on the ground were identified from the literature on the theoretical and operational frameworks for scaling up and out. Then, barriers and success factors are considered, identifying seven principles for successfully scaling SLM up and out. Incentives for the private, farming and policy communities to scale up SLM are proposed. Finally, the paper presents a practical framework for scaling SLM up and out to reverse land degradation and help meet Sustainable Development Goal (SDG) target 15.3 and the objectives of UNCCD to achieve land degradation neutrality and promote sustainable land management.[11] The essence of this framework is presented in Part Three of the Global Land Outlook.

2. Factors to consider for scaling up and out

There are a range of factors that influence the adoption of innovations,[12-15] which can be summarized as:

1. **External, contextual factors**, including demographic (for example, age and gender), socio-cultural (for example, prevailing norms), economic (such as incentives or disincentives), and political and institutional factors (for example, infrastructure to enable the adoption of SLM); and

2. **Internal, individual factors**, including attitudes, values and beliefs related to the environment, compared to other competing non-environmental motives, personal capabilities (for example, knowledge and skills, disabilities), resources (such as time and money), habits, emotional involvement with environmental problems, such as land degradation, and a belief that it is possible to bring about change through individual action.

Existing operational frameworks for scaling up have the following common elements:

- Identification of a successful intervention, defining what is to be scaled up, usually either a technology, a process or organizational innovation

- Selection of a scaling up method from the range available
- Development of a vision and assessment of the scalability of an intervention or innovation through a diagnosis that includes all actors or stakeholders, is interactive, multi-disciplinary, and multi-sectoral
- Identification of barriers or constraints to scaling and ways to remove them, perhaps using a theory of change process that results in a favorable enabling environment
- Development of a communication and constituency-building process for increasing public and stakeholder awareness and collaboration, and
- Tracking of performance through a monitoring and evaluation process that also helps to quickly identify bottlenecks and suggest course changes in the process and provide feedback for modifications and innovations.

When barriers or constraints are being considered for scaling up, Sumberg[16] suggests clearly separating endogenous manageable constraints (for a potential user of an innovation) from prerequisite conditions (that are exogenous). Endogenous constraints include whether or not there is a requirement or demand for the innovation and that it be profitable and reliable within a management and environmental range that is acceptable to the potential adopters. Prerequisite or exogenous constraints include required inputs such as land, labor, capital, seeds, fertilizer, agro-chemicals, as well as information on how to use them together with favorable policies and organizational or institutional capacities that support better coordination. While all these conditions need to be met for adoption, it is only the endogenous constraints that should be specifically targeted during project/program design and implementation, as these can be most easily modified. Exogenous constraints are normally outside the control of the innovation project/program and must be addressed before adoption or scaling up can be expected.

3. Barriers and success factors for scaling up and out

Barriers and success factors in scaling up can be identified at the levels of farmers or communities, policy makers and the private sector. Barriers to scaling up SLM differ between contexts and over time. Identifying the main barriers or drivers in any particular context from an array of contributing factors is a key first step. The scaling up process should adapt to these[17] and not get entangled in the seemingly endless complexity of socio-ecological systems. Key barriers to scaling up and out include a lack of:

- Technical options for the specific need and context being considered and/or awareness of these options by land users
- Adequate institutional, human and financial resources for capacity building and extension services
- Finance at macro- and micro-level within public government budgets, local organizations and individuals, as well as the aversion of private sector investments in smallholders
- Political will to address problems in marginal areas
- Awareness of innovative approaches to incentivize SLM, such as payments for ecosystem services and insurance schemes

Additional barriers include:

- Conflict among actors over resources, such as access to and the availability of land and water
- High investment risk for individuals and the private sector
- Loss or turnover of individual champions that drive the scaling up processes in specific situations

From an analysis of existing frameworks and barriers, seven critical success factors are derived that can be integrated into scaling up strategies. These factors are considered below.

3.1 Plan adaptively and fund consistently

The majority of SLM interventions to date have been conducted at case study or pilot scales, ranging from villages to water basins and landscapes. Limited understanding of the replicability of SLM in ecological and socio-cultural contexts that differ from the original contexts where the options were developed, and of adoption processes at national and international scales, makes it difficult to design scaling.

Planning for success at scale requires a combination of top-down approaches via national and international policy processes, such as UNCCD National Action Plans, its voluntary programme on Land Degradation Neutrality, and other bottom-up approaches via local stakeholder networks. Setting clear milestones that relate to scaling via a well-defined theory of change and impact pathway helps bring divergent views and options together, further cementing a joint understanding and vision of the objectives of scaling up.

Scaling SLM up and out requires consistent funding, and to overcome this constraint, it may be necessary to consider alternative funding models and approaches to scaling up, for example:

- Payments for Ecosystem Services schemes may promote upscaling of SLM technologies that deliver measurable improvements in climate change mitigation (for example, carbon sequestration and storage), water quality and biodiversity benefits. In privately financed schemes, upscaling may prioritize locations or systems where tangible benefits can be delivered most cost-effectively, whereas public schemes may prioritize locations where the greatest public benefits can be derived, whether or not these are cost-effective in terms of ecosystem markets. Ideally, these different aims need to be brought together to develop a solid investment case for public-private partnerships at the landscape scale

- International donors each have different priorities, which will influence the selection of SLM technologies and approaches likely to be promoted in upscaling
- Table 1 and Appendix I highlight various examples of SLM being promoted, such as via community development planning in Morocco, which combined both top-down and bottom-up approaches to scaling up and out
- Corporate Social Responsibility (CSR) or Shared Value interests[18] from multinational corporations could fund SLM upscaling and, depending on the priorities of the company, may shape the upscaling process in different ways. For example, for some companies that depend on agricultural commodities, CSR may focus on creating sustainable value chains, which may in turn prioritize SLM options that provide clear and measurable environmental sustainability outcomes.[19] Other companies measure CSR outcomes in the number of "lives changed" and may be more interested in SLM options that provide measurable social and economic sustainability outcomes

The costs of restoring degraded land are estimated to be in the billions of dollars, far greater than is available from public funds.[20] Furthermore, achieving land degradation neutrality requires a longer-term commitment to funding that is often unavailable from development funds and the private sector. In addition, much of the benefits of SLM may be public goods, such as water regulation or job creation, making it difficult for private sector funding. Nevertheless, the involvement of the private sector is a must and private-public partnerships offer a way to overcome many of these problems.

3.2 Select SLM options for scaling up and out based on the best available evidence

There are many types of evidence that can be used to select the most relevant SLM options for scaling up and out. Economic evidence is key to convincing both policy makers and land managers to invest and re-direct policy and practice towards successful SLM options. Establishing the economic value of land and the benefits of restoration and sustainable

management can help position SLM as a compelling priority within other development needs. For a more detailed discussion of the economic aspects, we refer to the publications from the Economics of Land Degradation initiative[21] and its webpages at www.eld-initiative.org.

While economics can be a powerful driver of decisions, the social and cultural dimensions of land use change should not be overlooked when introducing new SLM options. A range of non-monetary valuation techniques has been developed to capture collective meanings and significance ascribed to natural environments. These techniques often use participatory and deliberative modes to include multiple perspectives and dimensions of value.[22]

Taking this more pluralistic approach to the benefits of SLM recognizes that evidence is rarely clear-cut or uncontested. Rather, increasingly diverse knowledge claims need to be evaluated as part of the decision-making process.[23]

In studies on the success of payment for ecosystem service schemes, Posner et al.[24] suggest that it is the legitimacy of evidence and knowledge (when perception as being unbiased and representative of multiple points of view) rather than its credibility or salience that tends to carry more weight with decision makers. Decision makers must consider moral and ideological arguments alongside practicalities (such as budget constraints and employment opportunities) and unpredictable external events that constantly change the parameters of the decision being made.

3.3 Identify and engage stakeholders at all relevant scales, recognizing and appealing to the motives of different groups

Effective engagement of stakeholders across multiple scales is critical for scaling up SLM. This will ensure that SLM technologies and approaches are socially and culturally appropriate when applied beyond the context they were developed in. As a result, SLM

technologies and approaches are increasingly being developed in cooperation with land managers and other stakeholders to ensure that they are well-adapted to local needs.

There is a number of steps needed to successfully integrate stakeholder engagement into the upscaling process. The first is to systematically identify stakeholders in SLM from local to national and international scales, characterizing their relative influence and interest in SLM and identifying how any barriers to engagement may be overcome. This should include the identification of both winners and losers, and those who can facilitate and block upscaling.[25] By identifying stakeholders at nested spatial scales, it is possible to identify trade-offs arising from the adoption of certain SLM options for different groups, for example, impacts of irrigation for downstream water users. Once trade-offs have been identified, it is possible to facilitate a benefit-sharing dialogue between affected stakeholders to manage conflict and mitigate the worst negative effects.

Equally important is engagement at the highest possible levels with the policy community, from junior and senior civil servants to government ministers. SLM scaling must be linked to national policy priorities and initiatives to pursue a more coordinated mobilization and use of financial resources at the scales necessary to upscale SLM nationally. Although rare, there are persuasive examples where SLM has been scaled up via national policy processes that connect to local community engagement. For example, in Morocco, SLM was integrated into a national community-development planning process, providing resources for community engagement at local levels while promoting SLM nationally (see Table 1 and Appendix I).

Upscaling SLM also involves a process of social innovation, and care must be taken to avoid elite capture and dominance of particular groups that can bias outcomes.[26] Based on empirical evidence from participatory SLM processes around the world,[27] three distinct principles emerge to ensure effective stakeholder engagement in SLM:

- Represent all the relevant stakeholders
- Employ a professional facilitator to help manage power dynamics between stakeholders, and
- Equip stakeholders with information and decision-making power so they can meaningfully participate in the scaling process

Evidence from various sources[17,28] suggests that trust building sometimes requires long periods of time, yet is essential for success. This can present difficulties when projects are short-term, resulting in the withdrawal of support and staff when a project ends. The inability to maintain a long-term commitment can act as a significant barrier to scaling up.

3.4 Build capacity for scaling up and out

The ways and means to scale up SLM practices require capacity building across all scales, from farmers and private sector to national and international policy makers. Once a decision is taken that an intervention indeed has scope for scaling up, the limits or boundaries need to be defined, for example, a watershed, national or international scale. As interventions are contextual, it is the principals of scaling that need dissemination rather than the specific options considered for a particular context. Similarly, as scaling up can often take more than ten years, it is important to put in place the institutional capacity and incentives that go beyond individuals who may not be able to commit long-term. Governments can establish capacity-building programs that match their interests and priorities, such as demonstrated in the CASCAPE project in Ethiopia. Supported by the Netherlands and part of its Agricultural Growth Program of Ethiopia, CASCAPE or Capacity Building for Scaling Up of Evidence-based Best Practices aims to strengthen the capacity of stakeholders to scale up best practices for improving agricultural production.[29]

3.5 Lead: foster institutional leadership and policy change to support scaling up and out

More often than not, there is a need to identify and engage a champion from one or more actor groups who can lead and connect different interests. This can be an enthusiastic NGO leader, member of a farmer group, politician, financier, or a research team leader.
In addition, the following factors are important:

- Develop an influencing strategy to engage key policy stakeholders, working where necessary with high-level intermediaries to build momentum for policy change
- Work with opinion leaders, champions and influential organizations (from local to national, using traditional, customary or innovative approaches) to foster leadership, vision and values that can support scaling up and out

3.6 Mobilize: achieve early, tangible benefits for as many stakeholders as possible to engage in activities to scale up and out

Scaling up and out processes can require sustained inputs from a range of stakeholders including land managers, NGOs, the research and business communities, donor and policy makers. To both mobilize and retain stakeholder engagement, it is necessary to provide tangible, short-term benefits that generate meaningful value for those involved. Section 4 will consider a number of ways in which each of these groups can be motivated to support and engage in activities to scale SLM up and out. In addition to incentives, it is important to identify disincentives, subsidies or perverse incentives that may slow the pace at which SLM can be scaled or lead to disengagement from stakeholders.

3.7 Monitor, evaluate and communicate

Finally, it is essential to learn from both successes and failures to develop best practices in scaling SLM up and out. To do this, it is necessary to monitor progress towards SLM targets and evaluate the impacts of SLM against measures of sustainability, including livelihoods.

The UNCCD's 1st Scientific Conference proposed a knowledge-management framework for SLM that involved the participatory development of indicators,[30] some of which have been proposed to monitor progress towards the SDGs. Such monitoring approaches do more than simply provide a measure of progress. They facilitate learning among different stakeholder groups across scales, and if designed and implemented in collaboration with stakeholders, they can enable continuous learning to improve SLM practices and ensure more effective scaling up and out. Table 1 illustrates the success factors in four selected case studies, while Appendix I presents these and other case studies in more detail.

Table 1: Matrix of success factors and case studies

Key success factor	Case study 1 Morocco 'Programme Oasis Sud'	Case study 2 Project Wadi Attir, Israel	Case study 3 Western Rajasthan, India	Case study 4 ALTAGRO project in Peruvian Altiplano
1.Consistently fund and adaptively plan	Achieved financing of 46 district development plans from national budget. Budget increased from a $3 million programme to a cumulative budget of $77 after nine years	Donations and government support	Limited to a research grant	Long-term research and development grant from several donors and a successful revolving fund
2.Select SLM options for scaling up and out, based on best available evidence	SLM practices selected and spread across 195 000 ha included the promotion of sustainable water management, erosion control and sand dune fixation	Perennial plant cover with agroforestry trees, construction of catchments and terraces, soil conservation practices	Drought proofing via tolerant varieties, soil and water conservation, integration of perennials, rain water harvesting, diversification and inclusive value chains	Quinoa cropping, dairy farming and trout farming and their value chains
3.Identify and engage stakeholders at all relevant scales, recognizing and appealing to the motives of different groups	Includes wide variety of development actors and empowerment of women	Limited to one 'wadi,' developed by the Sustainability Laboratory, Hura Municipal Council and scientists from a university	Recognition of household heterogeneity, creation of multi-stakeholder innovation platforms and village development committees	129 rural communities engaged
4.Build capacity for scaling up and out	Inter-community collaboration is facilitated	Limited to one catchment. Involves a regional education center	Capacity to self-organize through village development committees and innovation platforms	Training of 84 families in seven groups for trout farming as a new enterprise. Training of 1175 and 563 families in quinoa cropping and dairy production, respectively
5.Lead: foster institutional leadership and policy change to support scaling up and out	Facilitated community development plans		Nurtured institutional mechanisms at village to regional level	Organized producer groups
6.Mobilize: achieve early, tangible benefits and incentives for as many stakeholders as possible to engage in activities to scale up and out	11 urban municipalities and 45 rural districts reached			Availability of credit to switch practices was crucial
7.Reflect and communicate	Project needs a strategic socio-economic vision		Participatory agro-ecosystem analysis facilitated cooperation and willingness to adopt SSLM practices	

4. Incentives for scaling up

Incentives aimed at scaling up SLM need to be designed based on a thorough diagnostic of stakeholder needs, their local or traditional knowledge, and a critical appraisal of existing incentives and their impacts, both positive (enabling) and negative (perverse). Generally, incentives are not harmonized to encourage multiple benefits and are sometimes conflicting (for example, agricultural subsidies that encourage overproduction through intensification, but that results in greater environmental damage from land degradation and nutrient pollution). For SLM, there is a particular challenge to align incentives for short-term private and local benefits, often within one growing season, with long-term public benefits. Knowledge exchange between land practitioners and the research community on the drivers of land degradation and available amelioration practices for land restoration can act as an incentive for smallholders to adopt innovative approaches if the pre-conditions outlined earlier are met.

4.1 Private sector incentives

With few exceptions, the private sector and especially large multinational agricultural conglomerates have yet to exploit the provision of SLM inputs, technologies, market chains and other products and services for smallholder farms. Yet this sector, which produces much of the world's food – for example, 70-80 per sent in Asia and Africa – will play a key role in meeting the challenge of feeding the rapidly growing world population. The reasons for the limited involvement of the private sector in advancing SLM approaches include lack of financing, inhibitory laws and regulations, weak distribution channels and insufficient labor.[32] New technology services and payment schemes have been identified as the primary opportunities for private sector involvement. They include more accurate location analyses, such as road infrastructure, cellular phone coverage, Internet presence, access to credit, availability of electricity, and the presence or absence of market barriers. New geographic

information systems and spatial analyses can now be used to easily generate maps of populations, vegetation trends, markets, and risks that can help target SLM practices.

Advances in the private sector development of new Information & Communication Technologies (ICT), such as advanced soil and water sensors and monitoring equipment, will allow farmers to monitor soils and crops more effectively, thus building on their abilities to use resources efficiently. These technologies are likely to be central to farmers of the future, including smallholders, and should appeal to young farmers who already use ICT. Thus, not only efficiencies can be improved, but social benefits also gained through increased interest in farming and business development in rural and peri-urban environments, along with increased financial advantages.[33]

The private sector can target existing retailers rather than smallholders, directly allowing them to improve their distribution channels and access information held predominantly by the public sector when given the right incentives. One target could be retailers, who not only sell products, but who can also offer advisory or extension services that governments are unable to provide. Thus, coupled packages of products and advice can offer greater growth opportunities, especially in areas where digital and advisory capacities are poor. Hubs of new economic activities in small to medium-size towns[34,35] may offer the required scales to attract the private sector and create jobs in the agricultural and rural service sectors. The provision of information, better management and higher productivity would increase trust and customer loyalty.

Innovative payment methods will also help attract the private sector. Awareness, advantage, affordability and access have been identified as key determinants for adoption and scaling.[36] The retail sector has worked to develop payment schemes designed for cash-poor consumers who may not have access to banks. These include mobile money, escrow services, small

loans and mobile vouchers.[37] Much can be learned from the general retail sector and how to apply this to smallholder farmers and the promotion of SLM.

Private sector flexibility in the timing of sales can greatly help smallholders with sales of input vouchers for seeds and fertilizers, which can significantly increase land use and productivity.[38] Mobile banking can also help put vast amounts of remittances from abroad to better use by eliminating high interest rates on international transfers that other banking methods require.

Retailers, smallholders and entrepreneurs can help by becoming involved in multiple services via cloud sourcing and e-commerce related to weather forecasts, insurance, crop purchasing prices in different markets, soil maps, recommended crops and location-specific varieties, water availability, interactive mobile applications and videos on crop, pest and disease management. The dissemination of farming practices can be promoted by farmers themselves through activities such as Digital Green,[39] creating greater demand for products and services.

To realize these opportunities, the private sector needs incentives and co-financing for large scale public-private partnerships. In particular, there needs to be a focus on minimizing the risk for investments in land-based projects by providing guarantees from the public sector if projects fail or by offering tax allowances for investing in restoration projects.[40] This requires working with finance experts to de-risk restoration investments by considering both private and public investments. In addition, new methods of raising finance need to be explored to support scaling up, such as bundling private sector income streams with public goods. This could involve combining non-timber forest products with public goods such as reliable water supplies.

Most of these opportunities will require innovative partnerships, greater collaboration and connectivity among stakeholders together with technological innovations spanning

agricultural value chains. These value chains are increasingly being viewed as closed-loop chains rather than the traditional linear chains from production, manufacture, distribution, retail, consumer and disposal.[41] As profit margins are generally smaller in agriculture, there is increased interest from the private sector in scaling up and out that can stimulate profit-generating partnerships. Major NGOs such as Oxfam can take a lead in creating an enabling environment for greater engagement of the private sector with smallholders via innovative partnerships in sustainable food production.[42]

4.2 Incentives for farmers and their communities

Farmers often improve conventional 'transfer of technology' practices and the efficiency of their operations using natural processes and beneficial on-farm interactions, such as nutrient recycling to reduce their costs for inputs. However, the number of farmers that achieve these benefits is generally small, as these changes are not without costs for labor and inputs, such as agrochemicals and machinery. Engaging with innovative farmers is probably one of the quickest ways to promote novel approaches. The factors that determine whether or not a farmer can or is willing to innovate include their age, experience, personality, wealth status, whether they have been previously exposed to innovation and are involved in integrated farm systems.[43] There is a need to design incentives that encouragefarmers and allow the innovators to flourish. As part of a general strategy to engage stakeholders,[44] there is a number of processes that can encourage innovation and the testing of interventions. Farmer field schools[45] and farmer competitions can, for example, bring prestige and strengthen cultural identities, thus enabling greater knowledge exchange and learning.

4.3 Incentives for policy makers to promote scaling

More than anything, policy makers require practical solutions that are not only relevant to a broad range of stakeholders, but also create a legacy of actions and a vision of what the future of the environment can be if SLM practices are upscaled.

Policy makers will likely respond more readily to evidence that the implementation and scaling up of SLM practices will contribute to more pressing challenges, such as unemployment, migration, food security in fragile states, and the assurance of future capacities of natural resources to provide goods and services for society. Equally important is evidence that the neglect or over-exploitation of land resources will result in increasing scarcities of food, water and employment.

Sound business cases are required for the implementation of SLM practices to generate multiple benefits such as job creation, higher incomes, improved productivity and the provision of other ecosystem services, including opportunities for eco-tourism and the preservation of cultural identity related to the natural environment. SLM needs to appeal to the interests of multiple sectors that can benefit from good land management practices and are also affected by the negative impact of poor land management on agriculture, environment, water and energy.

5. A new framework for scaling up SLM options to reverse land degradation

Figure 1 below outlines the eight steps of a proposed framework for scaling up. Step 1 determines the scope of scaling at the outset, setting the boundaries as either biophysical or administrative. Through an inclusive process that engages all actors, a thorough diagnosis of the cultural, social, economic, technological, political and environmental context and the main drivers of change are identified (Step 2). Using the indicators proposed by the UNCCD and others,[11,46] the baseline state of land condition needs to be defined (Step 3). This is followed by a screening of potential

SLM options from various perspectives, including improvements in crop or biomass productivity, economic cost and benefits, social and cultural acceptance, the identification of potential adopters, their constraints and prerequisite conditions (Step 4). A parallel process ensures that the potential SLM options are appropriate in the context and constraints of the adopters (Step 5). Next on the ground, prioritized options are established through pilot and demonstration sites (Step 6) with a clear idea on what is being scaled (technology, process or organizational component). Assuming that the interventions have already a sound base for success, a dissemination strategy (Step 7) begins in parallel to Step 6.

Whether or not there is a sound basis for success, depends on the sort and scope of evidence that exists. The standards of evidence range from an innovation with minimal objective evidence, a promising practice with anecdotal reports, a model that has positive evidence in a few cases, good practice with clear evidence from several cases, best practice with evidence of impact from multiple contexts and through a meta-analyses, and finally a policy principle that is proven.[11] The promotion of an innovation or intervention generally relies on evidence from this range but also on 'knowledge politics' that transform sometimes relatively weak evidence into persuasive narratives to gain both political and financial support, and which are often driven by 'champions of the cause.' This is part of the communication and constituency building for public awareness. Whitfield et al.[47] provide a good example of this with respect to the SLM practice of conservation agriculture and caution that critical reflection is needed when 'bandwagons' are created that drive the promotion of interventions. Here, science can play a major role in helping to understand which contexts (biophysical, socio-economic, cultural, political and financial) a particular SLM option requires to be adopted and scaled up. This can help achieve better results

and avoid disappointments often associated with development projects that were envisioned as self-sustaining and were later discontinued due to the lack of follow-though .

Interaction and inter-connectedness between participating agencies play an increasingly important role (Step 7), with the focus on efforts being effectively allocated and shared among participating actors (farmers, NGO's, extension and government agencies, private sector, donors and research organizations). Such interactions, however, are needed from steps 4-7. Step 7 is particularly relevant in addressing issues that require a broad network of agencies, including research institutions, government and non-government organizations, civil society organizations and the private sector. The agencies play different roles, from promoting the intervention or innovation to acting as brokers that bring agencies together and form networks, change institutional arrangements and help raise the resources required.[48] A dissemination strategy should ensure alignment with larger scale initiatives, such as the UNCCD National Action Programmes. Often missing in SLM programs and projects is an adequate process of monitoring and evaluation that gives feedback to all actors, encourages more innovation platforms or other arrangements, and allows space for changes and introductions of new or alternative options into the framework (Step 8). The role that multi-stakeholder mechanisms play, and their increasing importance in achieving scaling up is well recognized in this framework. The advantage of multi-stakeholder arrangements is that they can be vehicles for further adaptation and innovation that move beyond a simple scaling out of a particular intervention.

6. Conclusion

In general, frameworks for achieving scaling up rely on the identification of a successful intervention and its scaling boundaries, selection of methods, a vision and assessment of the

scalability of the intervention and barriers to implementation. From this, seven critical factors were identified for successful scaling up of SLM practices:

i) Adaptively plan and consistently fund, combining top-down and bottom up approaches via stakeholder networks;
ii) Select SLM options for scaling up based on best available evidence;
iii) Identify and engage stakeholders at all scales
iv) Build capacity for scaling up including how to establish and strengthen collaborative mechanisms
v) Foster institutional leadership and policy change to support scaling up
vi) Achieve early tangible benefits and incentives for as many stakeholders as possible, and
vii) Monitor, evaluate and communicate

A range of incentives for farmers and their communities, policy makers and the private sector has been identified. Innovations for the public-private partnership sector include innovations in ICT and taking a fresh look at the role of retailers, their place in the value chains and potential to provide additional services, such as weather forecasting, insurances and pricing information, as well as other agricultural extension services.

Scaling up requires coordinated planning and multi-stakeholder engagement across scales and sectors. Each separate SLM practice or intervention needs to be linked to the efforts and framework that promote land degradation neutrality at the local and national scales. Linkages or nodes that bring different levels together are key to successful scaling up via knowledge exchange and learning processes. Often the promoter of a technology requires another actor to foster collaboration between different agencies and networks (champions). A guiding framework for achieving the scaling up of SLM options was developed based on an eight step

iterative process. We believe this framework will complement the Land Degradation Neutrality Target Setting Progamme (LDN TSP) that is being implemented by the UNCCD to achieve land degradation neutrality.

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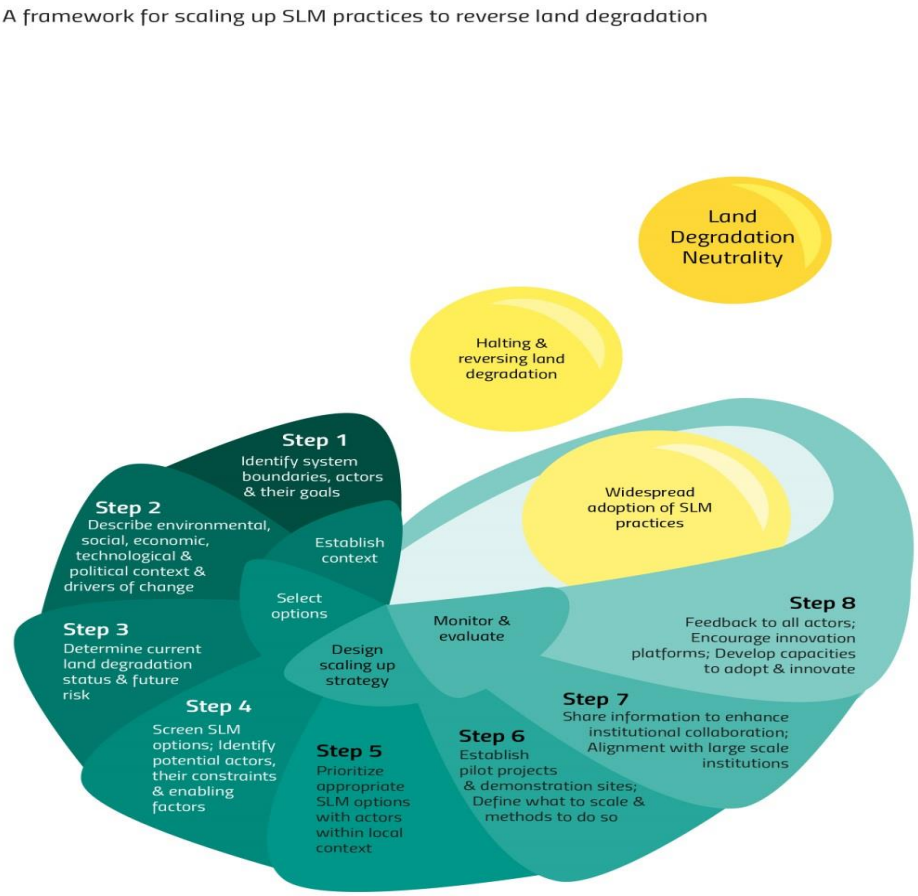
Figure 1. A framework for scaling up SLM options (see dropbox for final version of graphic; also bring this up to before Conclusion)



References

[1]UNCCD (2016a) http://www2.unccd.int/CRIC15-begins-in-Nairobi

[2]Steffen W, Richardson K, Rockström J, Cornell, SE, Fetzer I, Bennett EM, Biggs R, Carpenter SR, de Vries W, de Wit CA, Folke C, Gerten D, Heinke J, Mace GM, Persson LM, Ramathan V, Reyers B, Sörlin S (2015) Planetary boundaries: Guiding human development on a changing planet. Science 347:736-747.

[3]FAO (2009) How to feed the world in 2050, FAO, Rome, Italy http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

[4]World Economic Forum (2012) Putting the new vision for agriculture into action: A transformation is happening. World Economic Forum, Geneva, Switzerland.

http://www3.weforum.org/docs/WEF_FB_NewVisionAgriculture_HappeningTransformation_Report_2012.pdf

[5]WOCAT (2007) Where the land is greener – case studies and analysis of soil and water conservation initiatives worldwide. Liniger H-P, Critchley W (eds). CTA/FAO/UNEP/CDE

www.weforum.org/reports/redesigning-business-value-roadmap-sustainable-consumption

[6]Zucca C., Bautista S, Orr BJ, Previtali F. (2013) Desertification: Prevention and Restoration. In: Jorgensen S.E. (Ed.), Encyclopedia of Environmental Management. Taylor & Francis, New York. Vol. I, 594-609. DOI: 10.1081/E-EEM-120046343. ISBN: 978-1-43-982927-1.

[7]Thomas RJ (2008) Addressing land degradation and climate change in dryland agroecosystems through sustainable land management. J. Environ. Monit. 10: 595-603

[8]FAO/FESLM (1993) An international framework for evaluating sustainable land management. FAO, FESLM, World Soil Resources Report 73, FAO, Rome, Italy http://www.fao.org/docrep/T1079E/T1079E00.htm.

[9]Cooly L, Linn JF (2014) Taking innovations to scale: Methods, applications and lessons. Results for Development Institute/Management Systems International, Washington DC

[10]Douthwaite B, Alvarez S, Cook S, Davies R, George P, Howell J, Mackay R, Rubiano J. (2007) Participatory impact pathways analysis: A practical application of program theory in research-for-development. Can J. Progr. Evaln. 22: 127-159

[11]UNCCD (2014) Land degradation neutrality: Resilience at local, national and regional levels. UNCCD, Bonn, Germany.

[12] Linn J, Hartmann A, Kharas H, Kohl R, Massler B, (2010) Scaling up the fight against rural poverty: An institutional review of IFAD's approach. Global Working Paper No. 39, Brookings, Washington DC.

[13]MSI (2012) Scaling up – from vision to large-scale change: Tools and techniques for practitioners. Management Systems International, Washington DC.

[14]Reij C and Winterbottom, R. (2015) Scaling up regreening: Six steps to success. A practical approach to forest and landscape restoration. World Resources Institute. Available at http://www.wri.org/publication/scaling-regreening-six-steps-success and http://www.riopavilion.org/download-presentations/unccd-cop-12-ankara-2015/.

[15]Appadural AD, Chaudhury M, Dinshaw A, Ginoya N, McGray H, Rangwala L, Srivatsa S (2015) Scaling success: Lessons from adaptation pilots in the rainfed regions of India. World Resources Institute, Washington D.C.

[16]Sumberg J (2005) Constraints to the adoption of agricultural innovations. Outlook on agriculture 34: 7-10

[17]Campbell BM, Hagmann J, Stroud A, Thomas R, Wollenberg E. (2006) Navigating amidst complexity: Guide to implementing effective research and development to improve livelihoods and the environment. Center for International Forestry Research, Bogor, Indonesia ISBN: 979-24-4664-8.

[18]Porter ME, Kramer MR. (2011) Creating shared value: How to reinvent capitalism – and unleash a wave of innovation and growth. Harvard Business Review January-February 2011. www.hbr.org

[19]Syngenta (2016) The good growth plan: One plant six commitments.

http://www4.syngenta.com/~/media/Files/S/Syngenta/progress-data-2015-en.pdf

[20]Sewell A, Bouma J, van der Esch S (2016) Investigating the challenges and opportunities for scaling up ecosystem restoration. The Hague: PBL The Netherlands Environmental Assessment Agency.

[21]ELD (2015a) The value of land: Prosperous lands and positive rewards through sustainable land management. Stewart, N., Etters, H., Favretto, N., Gerhartstreiter, T. Schauer, M. Thomas, R. (eds). www.eld-initiative.org.

[22]Kenter JO, O'Brien L,Hockley N, Ravenscroft N, Fazey I, Irvine KN, Reed MS, Christie M, Brady E, Bryce R, Church A, Cooper N, Davies A, Evely A, Everard M, Jobstvogt N, Molloy C, Orchard-Webb J, Ranger S, Ryan M, Watson V (2015). What are shared and social values of ecosystems? Ecological Economics 111:86-99.

[23]Crilly, T. Jashapara, A., Ferlie, E. (2010) Research Utilisation & Knowledge Mobilisation: a Scoping Review of the Literature. Report for the National Institute for Health Research Service Delivery and Organization Queen's Printer and Controller of HMSO, London.

[24]Posner SM, McKenzie E, Ricketts TH (2016) Policy impacts of ecosystem services knowledge. PNAS.www.pnas.org/cgi/doi/10.1073/pnas.1502452113.

[25]Reed MS, Graves A, Dandy N, Posthumus H, Hubacek K, Morris J, Prell C, Quinn CH, Stringer LC (2009) Who's in and why? Stakeholder analysis as a prerequisite for sustainable natural resource management. Journal of Environmental Management 90: 1933–1949.

[26]Cooke B, Kothari U. (2001) Participation: The new tyranny? Zed Books.

[27]de Vente J, Reed MS, Stringer LC, Valente S, Newig J (2016) How does the context and design of participatory decision-making processes affect their outcomes? Evidence from sustainable land management in global drylands. Ecology & Society in press

[28]Kane-Potaka J (2013) The story behind the success: Ten case studies identifying what led to uptake of research for development. Colombo, Sri Lanka: International Water Management Institute (IWMI); Patancheru, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). 100p. doi: 10.5337/2013.208.

[29]CASCAPE (2015) Capacity building for scaling up of evidence-based best practices in agricultural production in Ethiopia. http://www.wur.nl/en/show/cascape-1.htm

[30]Reed MS, Buenemann, M, Atlhopheng J, Akhtar-Schuster M, Bachmann F, Bastin G, Bigas H, Chanda R, Dougill AJ, Essahli W, Evely AC, Fleskens L, Geeson N, Glass JH, Hessel R, Holden J, Ioris A, Kruger B, Liniger HP, Mphinyane W, Nainggolan D, Perkins J, Raymond

CM, Ritsema CJ, Schwilch G, Sebego R, Seely M, Stringer LC, Thomas R, Twomlow S, Verzandvoort S (2011) Cross-scale monitoring and assessment of land degradation and sustainable land management: a methodological framework for knowledge management. Land Degradation & Development 22: 261-271

[31]IAASTD. 2009. Agriculture at a crossroads: Sub-Saharan Africa (SSA) report (Vol. V). International Assessment of Agricultural Knowledge, Science and Technology for Development. Washington, DC: Island Press.

[32]Kohl, H., Hegde, N., Karamchandani, A. (2014) *Beyond the Pioneer: Getting Inclusive Industries to Scale*, Mumbai: Deloitte Touche Tohmatsu India Private Limited.

[33]Deloitte Review (2016) From dirt to data: the second green revolution and the Internet of Things. Deloitte Review 18

[34]INTELI (2011). Creative-based strategies in Small and Medium-sized Cities: Guidelines for Local Authorities. (Creative Clusers in Low Density Urban Areas Working Paper). Moreira da Maia, Portugal: Inteligência em Inovação. Retrieved from http://urbact.eu/sites/default/files/import/Projects/Creative_Clusters/documents_media/URBACTCreativeClusters_TAP_INTELI_Final_01.pdf

[35]Hesse C, Anderson S, Coutla L, Skinner J, Toulmin C (2013) Managing the boom and bust: Supporting climate resilient livelihoods in the Sahel. IIED issue paper, IIED, London, UK. http://pubs.iied.org/11503IIED.

[36]Tam, V., Mitchell, C., Martins, F., Dichter, S., Adams, T., Ullah, N., Tata., S. (2014). Growing Prosperity: Developing Repeatable Models to Scale the Adoption of Agricultural Innovations, Boston: Bain and Company.

[37]Martin, C., Harihareswara, N., Diebod, E., Kodali, H, Averch, C. (2016). Guide to the Use of Digital Financial Services in Agriculture. (USAID). Washington, DC: USAID's Mobile Solutions Technical Assistance and Research. Retrieved from https://www.usaid.gov/sites/default/files/documents/15396/Guide%20to%20DFS%20in%20Ag_Web_Final.pdf

[38]Carter, M. R., Laajaj, R., Yang, D. (2013). The impact of voucher coupons on the uptake of fertilizer and improved seeds: evidence from a randomized trial in Mozambique. American Journal of Agricultural Economics, *95*(5), 1345-1351.

[39]Gandhi, R., Veeraraghavan, R., Toyama, K., & Ramprasad, V. (2007, December). Digital green: Participatory video for agricultural extension. In Information and Communication Technologies and Development, 2007. ICTD 2007. pp. 1-10. IEEE.

[40]Cornell A, Weier J. Stewart N, Spurgeon J, Etter H, Thomas R. Favretto N, Chilombo A., van Duivenbooden N, van Beek C, de Ponti T (2016) Economics of Land Degradation Initiative: Report for the private sector. Sustainable Land Management –a business opportunity, GIZ: Bonn, Germany. www.eld-initiative.org

[41]World Economic Forum (2010) Redesigning business value: A road map for sustainable consumption.

[42]Oxfam (2010) Think big. Go small: Adapting business models to incorporate smallholders into supply chains. Briefings for Business 6, Oxfam International, UK.

[43]Reij C and Waters-Bayer A. (2001) An initial analysis of farmer innovators and their innovation. In 'Farmer innovation in Africa: A source of inspiration for agricultural development' p77-91. Reij C & Waters-Bayer A (eds.) Earthscan Publications, London, UK

[44]Reed, MS (2016) The research impact handbook. Fast Track Impact, UK.

[45]FAO (2015) Farmer field schools: a participatory approach to capacity building for efficient, sustainable and inclusive food production systems. http://www.fao.org/africa/news/detail-news/en/c/358283/

[46]UNU (2011) Guidelines for the preparation and reporting on globally-relevant SLM impact indicators for project-level monitoring. UNU-INWEH/GEF/UNDP. United Nations University, Hamilton, Canada

[47]Whitfield S Dougill AJ, Dyer JC, Kalaba FK, Leventon J, Stringer LC (2015) Critical reflection on knowledge and narratives of conservation agriculture. Geoforum 60: 133-142

[48]Hermans F, Stuiver M, Beers PJ, Kok K (2013) The distribution of roles and functions for upscaling and outscaling innovations in agricultural innovation systems. Agricultural Systems 115:117-128.