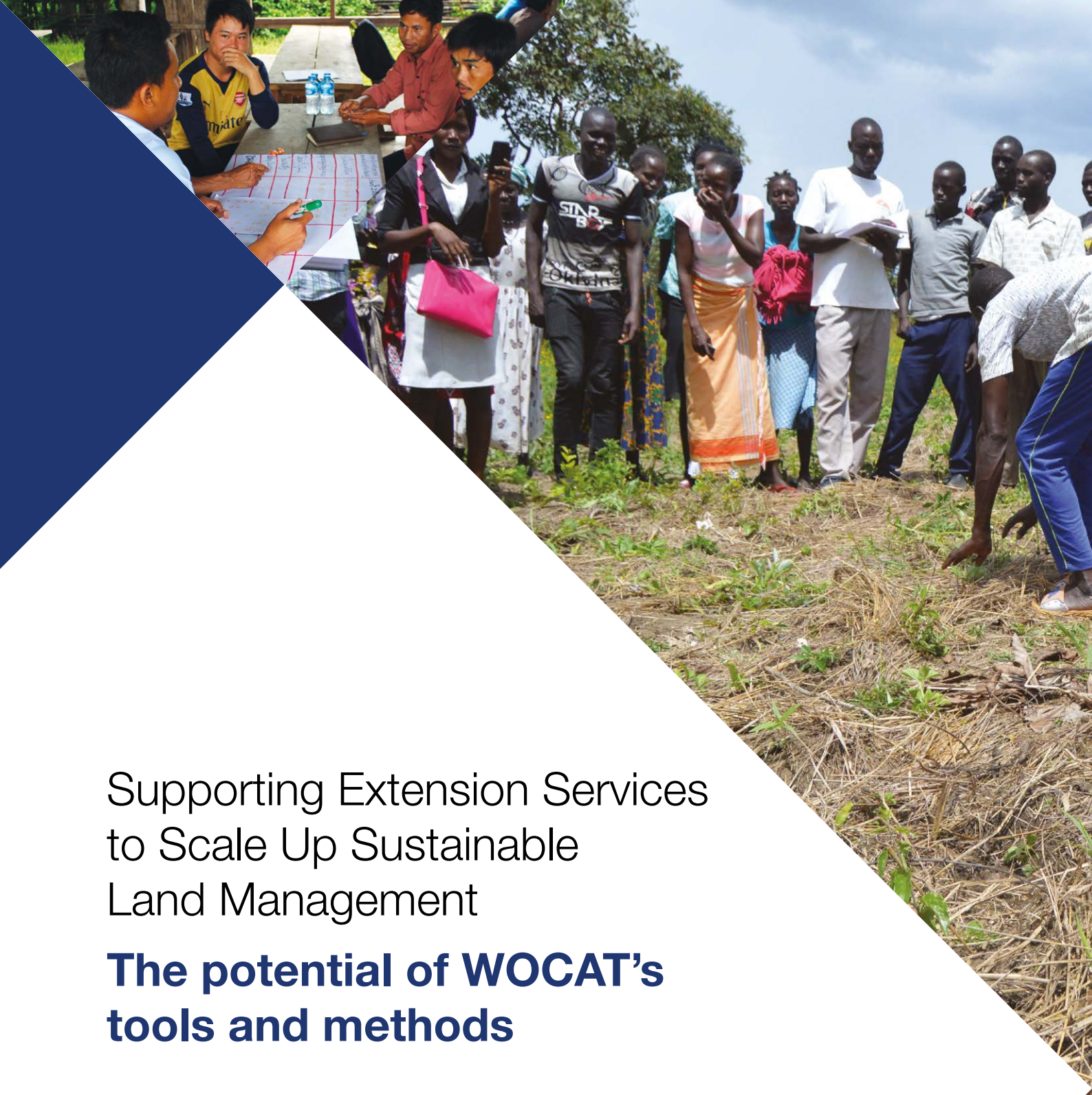

Supporting Extension Services to Scale Up Sustainable Land Management

The potential of WOCAT's tools and methods

IFAD
Investing in rural people

WOCAT
World Overview of Conservation Approaches and Technologies

UNIVERSITÄT BERN
CDE
CENTRE FOR DEVELOPMENT AND ENVIRONMENT

NAFRI

UGANDA LANDCARE NETWORK
A National Platform for LandCare Stewardship

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This document is based on lessons learned during implementation of the IFAD grant *"Scaling up sustainable land management (SLM) practices by smallholder farmers: working with agricultural extension to identify, assess and disseminate SLM practices"*, awarded to the Centre for Development and Environment (CDE), University of Bern, Switzerland, as the host of the World Overview of Conservation Approaches and Technologies (WOCAT) Secretariat.

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Abbreviations

CDE	Centre for Development and Environment
PFCA	participatory farmer-centred approach
SLM	sustainable land management
UNCCD	United Nations Convention to Combat Desertification
WOCAT	World Overview of Conservation Approaches and Technologies

Summary

This Lessons Learned publication reviews experiences from the IFAD grant "Scaling up sustainable land management (SLM) practices by smallholder farmers: working with extension services to identify, assess and disseminate SLM practices". The grant was managed by the Centre for Development and Environment (CDE) of the University of Bern in its role as the secretariat of the World Overview of Conservation Approaches and Technologies (WOCAT; www.wocat.net).

The three-year grant (2018-2020) was aimed at piloting – and gaining insights from – the application of WOCAT's SLM tools and methods (as described in section 3 and annex 1) with extension services in three countries, namely Cambodia, Lao People's Democratic Republic and Uganda. Partners were diverse: a university, a national agriculture research institute and an NGO, respectively. In each country, there was an ongoing IFAD-supported loan project, which was the main grant partner. Scaling up was to be achieved by working with these partners to enhance their communities' resilience to climate change shocks and other environmental pressures.

SLM is the official umbrella term for practices that counter land degradation and improve the health of the land. There is an urgent need to scale up SLM practices among smallholders to achieve multiple short- and long-term benefits:

- Increasing yields and making production more stable and sustainable, while improving livelihoods and strengthening resilience
- Contributing to the evolution of sustainable food systems
- Contributing to national targets: achieving land degradation neutrality, meeting Sustainable Development Goals and fulfilling nationally determined contribution targets.

Various existing WOCAT tools and methods for scaling up SLM with extension services and farmers were piloted. The participatory, farmer-centred approach focused on practices that were appropriate for smallholders – especially women and youth. It was based on three components:

- Establishment of a knowledge base:
  - Participatory mapping of land degradation hotspots and SLM good practices
  - Training of documenters and documentation of SLM practices
  - Development of SLM databases and knowledge products for different audiences
- A decision support process:
  - Multistakeholder consultations
  - Local-level decision support workshops
- Scaling up:
  - Outscaling (spreading of SLM) and mainstreaming (institutionalization) activities.

The identification and documentation process yielded a total of 119 SLM practices in the three countries. It was clear that smallholders prioritized SLM solutions that directly benefited them: the participatory farmer-centred approach was a powerful means of uncovering those practices that improved well-being, whether in terms of food or income. This further underlines the new emphasis of SLM: production rather than simply conservation of soil. These practices were recorded in WOCAT's Global SLM Database – which is recommended for best practice reporting by the United Nations Convention to Combat Desertification (UNCCD).

The next section provides key follow-up and recommendations for use by IFAD country programmes and project management units of IFAD-supported projects. The subsequent section outlines the WOCAT methodology applied in the grant, with case studies from each country. A final section on the lessons learned concludes the publication.

Follow-up and strategic recommendations

IFAD investments: strengthening SLM through WOCAT's methodology

1. It is recommended that further partnerships should be developed between WOCAT, IFAD country offices, their existing/future investment projects and national counterpart agencies to offer a fast track to scaling up SLM. SLM is becoming increasingly central to IFAD's investments owing to its role in addressing not just poverty and equity, but productivity, land degradation, agroecology, biodiversity protection, ecosystem restoration and disaster risk reduction, as well as its role in providing both an avenue for climate mitigation through carbon sequestration and options for climate change adaptation.
2. IFAD and governments can profitably use WOCAT's tools and procedures more broadly in natural resource management and climate-smart agriculture projects (see annex 2 for the WOCAT Services brochure, also available at www.wocat.net/library/media/253/). These methods can be used during the baseline survey to document what exists on the ground, and to identify where and which gaps need to be filled. Participatory decision support should be prioritized during the design process so that, during implementation, beneficiaries can select the practices to be promoted. The methodology can be a powerful tool during implementation and can feed directly into farmer field schools. It can also be valuable in the preparation of an exit strategy, which requires documented evidence and guidance to facilitate an enduring scaling-up process. However, participatory processes constitute resource-intensive and time-consuming exercises, and an appropriate budget needs to be defined.

Data: standardizing knowledge management and facilitating international reporting

3. Applying the WOCAT toolset helps programmes and projects to report SLM achievements in a standardized format, and facilitates national, regional and global sharing of evidence and experiences. Furthermore, as the Global SLM Database and the WOCAT network will outlive programmes and projects, sharing data and information through WOCAT will ensure the availability of and access to data and knowledge. It will thereby help ensure the durability and sustainability of knowledge management efforts throughout IFAD's programmes and projects.
4. National SLM databases, linked to WOCAT's Global SLM Database, provide valuable open-access sources on SLM practices, their use and the context in which they will work. As these repositories build up, they act as resources to inform the design of future SLM programmes and processes. They also help to provide evidence of country experiences, and thus contribute to attaining national and international targets and obligations. Furthermore, as part of UNCCD reporting, agencies are encouraged to enter and share SLM best practices in the Global SLM Database, and report on the UNCCD Performance Review and Assessment of Implementation System platform. This supports knowledge-sharing among

parties and agencies with regard to SLM good practices, and provides valuable evidence of which SLM practices can be implemented to reach land degradation neutrality targets by 2030 (Sustainable Development Goal 15.3). Furthermore, evidence based on SLM practices has been shown to help design and support national action programmes. National databases should be encouraged to grow in order to underpin these processes.

5. When IFAD invests in SLM, climate-smart agriculture or nature-based solutions, sharing good practices through the Global SLM Database will make sure that these IFAD-funded achievements are recognized. This also applies when countries report their best practices to the UNCCD, and when they report on their land degradation neutrality targets. The involvement of key SLM personnel, including the UNCCD focal points and associates, is key to creating ownership of the data and knowledge generated, and will facilitate its application in international processes.
6. In the context of climate change and the United Nations Framework Convention on Climate Change, evidence and quantification of the carbon sequestration benefits of proven SLM solutions will guide actions fostering land-based solutions to reach nationally determined contributions. The new linkage of the WOCAT Global SLM Database with the Carbon Benefits Project helps users to quantify the potential and actual carbon and greenhouse gas benefits of SLM solutions. This new toolset will prove useful to those developing SLM projects, and those carrying out SLM activities to provide input to nationally determined contributions. It will also facilitate reporting on achievements.

Capacity-building: creating foundations for the future

7. There is a need to continue working on capacity-building for the delivery of pluralistic extension services – of all types and at all levels, including private sector extensionists, and informal farmgate or "last mile" agents. Many universities, colleges and training institutes are looking for high-quality training material to strengthen their curricula in order to prepare youth for the challenges of this century. This grant has shown that SLM curricula can be readily developed and integrated into higher learning institutions and government extension training programmes.

Digitalization: ensuring connection between land users and extension messages

8. Digital advisory services are emerging, and their use in supporting the identification, testing and documentation of SLM should be part of any solution produced for advisory services. The Global SLM Database holds a wealth of knowledge of SLM solutions, with significant potential to inform extension advisers – if they are trained in using and equipped with access to digital devices. WOCAT should continue to strengthen its efforts in collaborating with the digital start-up Farmbetter Ltd and their Farmbetter application to develop user-friendly and relatively cheap digital solutions in agriculture for extension and farmers. This could then feed into future strategies to improve the extension of SLM.

South-South learning: sharing experiences and learning from each other

9. Further funding support and facilitation should be given to South-South learning, especially for the design of multi-country projects. WOCAT assists in this through continuing to build its network of regional WOCAT clusters – facilitating knowledge exchange and the co-development of knowledge at the regional level, and through connecting partners with similar interests/challenges. It also helps to build a bridge between knowledge providers and knowledge recipients. Cooperation with existing international/regional agencies/initiatives such as the African Forum for Agriculture Advisory Services (partly funded by IFAD) is crucial. This will help strengthen South-South learning with regard to the tools, methods and approaches that are working best to support the scaling up of SLM in different countries' contexts.

Impact: tracking changes and underpinning recommendations

10. Finally, in the project design of follow-up extension programmes, it is recommended that there should be a provision for ex post evaluations to assess the programme's impact. Quantitative evidence of the programme's impact over a reasonable timespan (at least five years) can strongly reinforce the credibility of early lessons and recommendations. There are simple and cheap participatory methods of tracking how far messages and actions have spread, what impact they have had on-farm, and to what extent institutional change has been stimulated.

Introduction

Background

This Lessons Learned publication reviews experiences from the IFAD grant "Scaling up sustainable land management (SLM) practices by smallholder farmers: working with extension services to identify, assess and disseminate SLM practices". The grant was managed by the CDE of the University of Bern in its role as the secretariat of WOCAT (WOCAT; www.wocat.net; box 1).

BOX 1 WOCAT

WOCAT is the global network for SLM and hosts the Global SLM Database in partnership with UNCCD. Over the past 28 years, WOCAT and its partners have developed a set of standardized tools and methods for SLM knowledge management and decision support. These are now used in over 50 countries around the globe. The availability of standardized data facilitates comparative analysis across projects, programmes and countries. WOCAT provides a robust basis for evidence-based decision-making in SLM mainstreaming and scaling out to improve production, attain land degradation neutrality, increase climate resilience and help ecosystem restoration.

SLM is the official umbrella term for practices that counter land degradation and improve the health of the land. WOCAT defines SLM as:

The use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and ensuring their environmental functions.
Liniger et al. (2011)

In turn, an SLM technology is defined in the WOCAT glossary as:

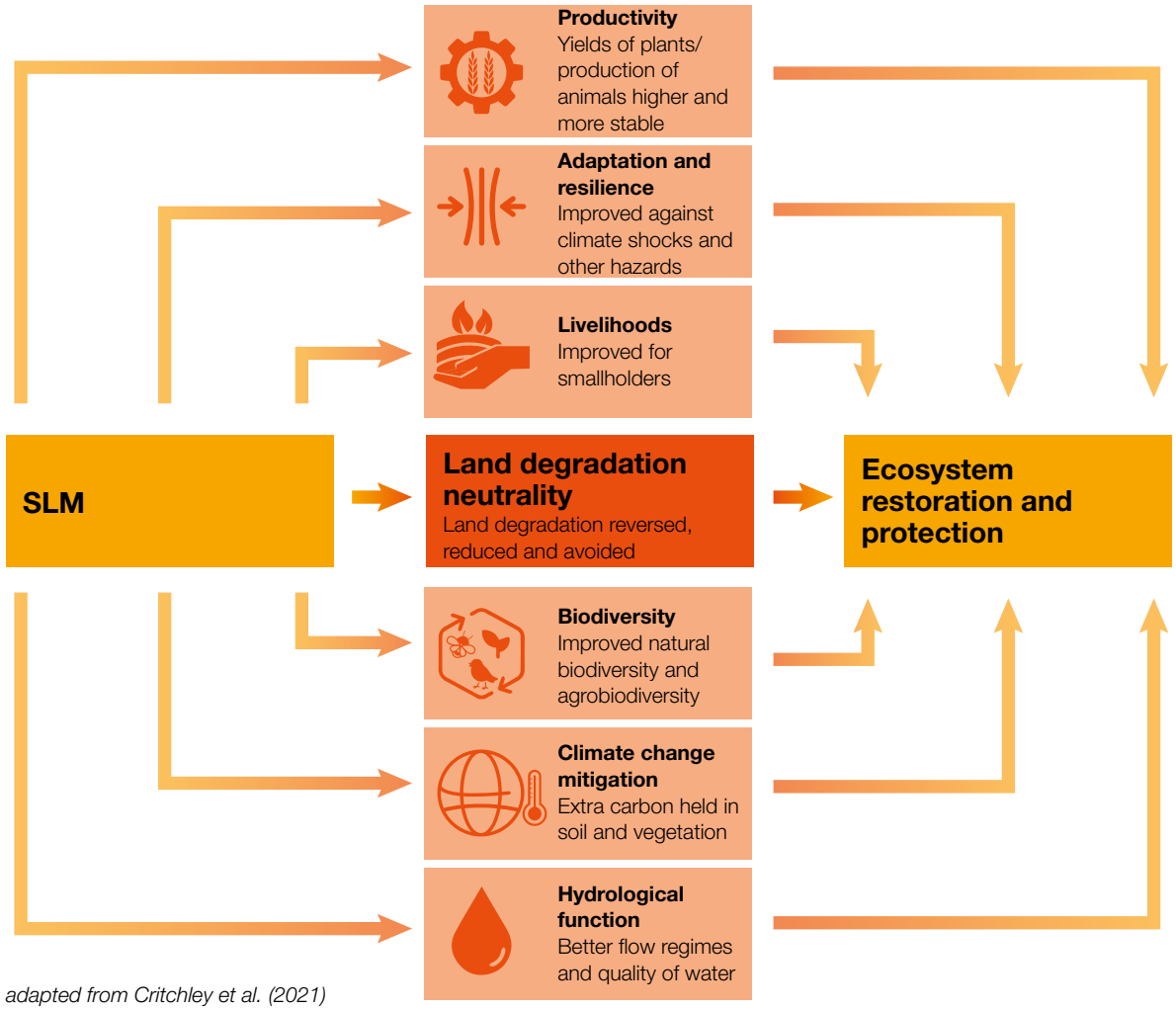
A practice applied in the field that controls land degradation and/or enhances productivity. It consists of one or several measures, such as agronomic, vegetative, structural, and management measures.

SLM has wide-ranging positive impacts on climate change, hydrology, biodiversity, production, livelihoods and resilience. Figure 1 illustrates these co-benefits.

Figure 2 presents land users' perspectives of the impact of the SLM technologies within WOCAT's Global SLM Database. Clearly, land users most appreciate SLM's roles in addressing land degradation, improving production and benefiting them economically.

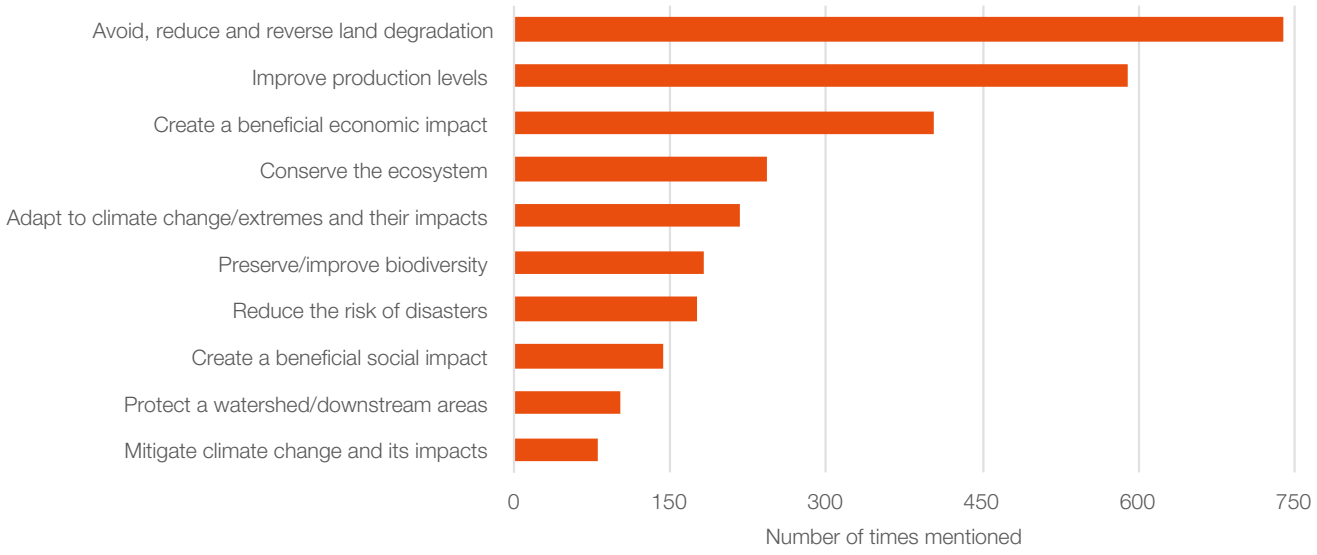
A progression in conceptual thinking over the last 25 years has led to our present understanding of SLM. The original idea of soil conservation was conceived in the

FIGURE 1 The multiple benefits of SLM



Source: adapted from Critchley et al. (2021)

FIGURE 2 Main purposes of SLM technologies from land users' perspectives



Note: Five answers from a predetermined list were possible for each technology.
Source: WOCAT Global SLM Database (1,086 technologies analysed: up to five choices per technology)

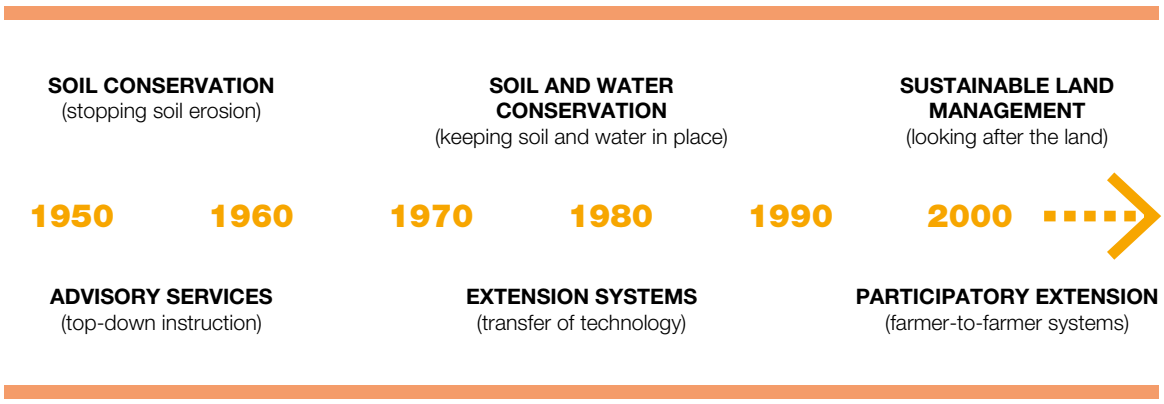
mid-twentieth century as a response to increasing concerns about soil erosion brought about by the expansion of mechanized ploughing in the United States of America. From engineering solutions – such as terracing – and strictly imposed legislation, the discipline has evolved towards associating natural resource conservation with the maintenance of productive land use (see Hudson, 1992; Hurni et al., 1996; Critchley et al., 2021). SLM forms the basis of much of what has been recently termed "regenerative agriculture" or "nature-based solutions".

Over the same period, a similar transition has taken place in extension methodologies. There has been a move from an authoritarian, top-down approach to one based on sharing knowledge, as it became better understood that rural communities have a profound understanding of land use and are often better placed to influence one another than extension agents (see Bunch, 1982; Chambers et al., 1989; Scarborough et al., 1997; FAO, 2016). However, despite the rhetoric and the theories, rural advisory services remain weak, and millions of smallholders are served by inadequate extension support (Fabergas et al., 2019). Furthermore, supporting farmers' decision-making has remained a blind spot, and we still do not know enough about which practices are best suited in which circumstances for women, men or youth. Schwilch, et al. (2012) pioneered a basic methodology for identifying and evaluating SLM strategies, and this has been refined by WOCAT (Bachmann et al., 2018), forming the basis for action under the current grant.

Participatory processes have gradually become central to development philosophy since they emerged in the 1980s. Pretty (1995) discusses "participation in development" and notes that although one school of thought views it as being a means to increase efficiency, another believes that community participation is a basic human right. Twenty-five years later, most development analysts would strongly support both these concepts. It is worth noting that a report on soil and water conservation commissioned by IFAD three decades ago notes that "beneficiaries need to be involved in all aspects of project identification, design and execution as well as monitoring and evaluation" (Free University Amsterdam, 1992). An authoritative and useful narrative tracing the evolution of participation in development over four decades is provided by the International Institute for Environment and Development (IIED, 2004). Figure 3 presents a simplified timeline of these developments.

Scaling up is another area in which theory has evolved over the last 20 years, moving towards community involvement (see IIRR, 2000; Gündel et al., 2001; DFID NRSP, 2002;

FIGURE 3 The evolution of sustainable land management and participatory extension



IFAD, 2015, 2018; FAO, 2016). Although the terminology can be confusing, it is usually understood that there are two elements to scaling up. The first is scaling out (also known as "horizontal spread", "dissemination of practices", etc.), and the other is mainstreaming ("institutionalization", "vertical integration", etc.). IFAD's definition of scaling up covers both elements:

Expanding, adapting and supporting successful policies, programmes and knowledge, so that they can leverage resources and partners to deliver larger results for a greater number of rural poor in a sustainable way. IFAD (2015)

The development literature may describe – and enthuse about – such changes, but the truth is that many countries have not yet transitioned towards production-oriented SLM. Nor do they employ participatory approaches to support development or use farmer-centred extension systems. A wide gulf remains.

The convergence of SLM and participatory farmer-centred approaches (PFCAs) is very relevant to IFAD's three strategic objectives and its cross-cutting themes with regard to mainstreaming. The WOCAT methodology being used here helps ensure that SLM is relevant to each of these, as outlined in box 2.

BOX 2 IFAD's strategic objectives and thematic focus, and how the WOCAT methodology ensures that SLM is relevant to each of them

IFAD's strategic objectives

- **Increase poor rural people's productive capacities**
  Multiple SLM practices focus on sustainable farm production without requiring high levels of investment.
- **Increase poor rural people's benefits from market participation**
  An effective farmer-centred extension service links smallholders to input and output markets.
- **Strengthen the environmental sustainability and climate resilience of poor rural people's economic activities**
  A central pillar of SLM is improving resilience through practices that are "climate-smart", and able to cope with stresses and shocks.

IFAD's mainstreaming cross-cutting themes

- **Gender**
  Through ensuring women make their own choices, the SLM practices they choose to promote are those they find affordable, implementable and rewarding.
- **Environment and climate**
  SLM is environmentally friendly by definition, and most practices ensure increased mitigation of and better adaptation to climate change.
- **Youth**
  Representation in local-level decision support ensures that youth's voices are heard – and the growing emphasis on digital technology appeals to youth.
- **Nutrition**
  Many SLM practices include or are based on species diversification through mixed planting with fruits, vegetable and/or legumes.
- **Indigenous people**
  Participatory identification of SLM contributes to the identification and documentation of indigenous practices, and empowers communities.

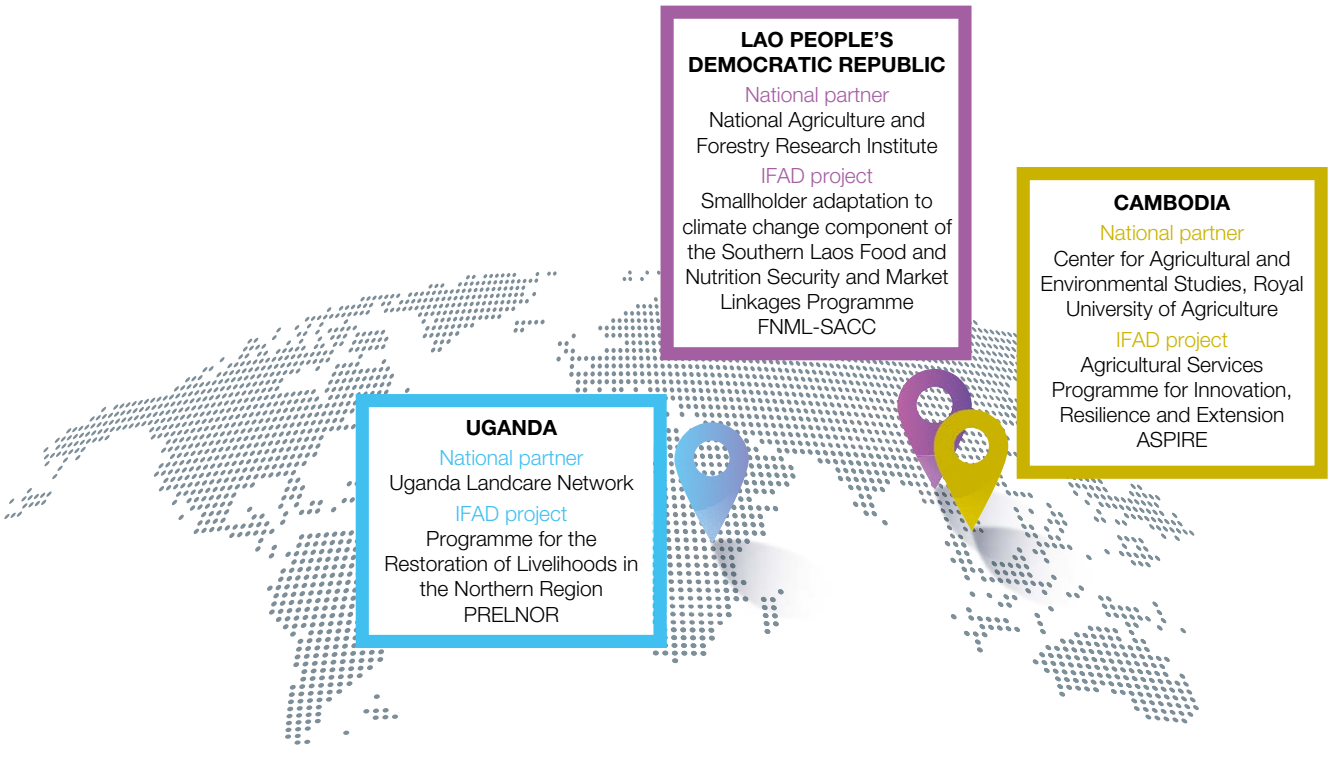
The grant

The grant was aimed at piloting – and gaining insights from – the application of WOCAT's SLM tools and methods with extension services in three countries, namely Cambodia, Lao People's Democratic Republic and Uganda. Partners were diverse: a university, a national agriculture research institute and an NGO, respectively. In each country, there was an ongoing IFAD-supported loan project, which was the main grant partner (figure 4). Scaling up was to be achieved by working with these project beneficiaries to enhance their communities' resilience to climate change shocks and other environmental pressures.

In each project, smallholders engaged with agricultural extension services through a PFCA. This included identifying, assessing, selecting – through decision support – and disseminating SLM practices, as well as building capacity and mainstreaming through policy development. The intention was to generate insights into how WOCAT tools could best be used to scale up SLM, and how they could be embedded into extension services, while creating a cadre of extension agents versed in the methodology. The resulting lessons would then help refine the methodology and demonstrate how it could be applied in different situations. It is clear that previous lessons learned had informed the design phase. These lessons included deriving synergies from forming alliances, the need for process monitoring, the imperative of gender sensitivity, the importance of building trust and generating a sense of ownership, and, perhaps most evidently, the central role of community participation.

The grant was specifically designed to build on farmers' existing practices: the hypothesis was that a rich pool of local, undocumented SLM exists in each of the countries. The process was based on a defined sequence of identifying these good practices with farmers, extension agents and SLM specialists; documenting the practices in a standardized format (which acts simultaneously as a joint learning exercise); and then using them to form the basis for decision-making processes. Disseminating the selected practices is the next logical step.

FIGURE 4 Countries, national partners and related IFAD projects



Challenges and context

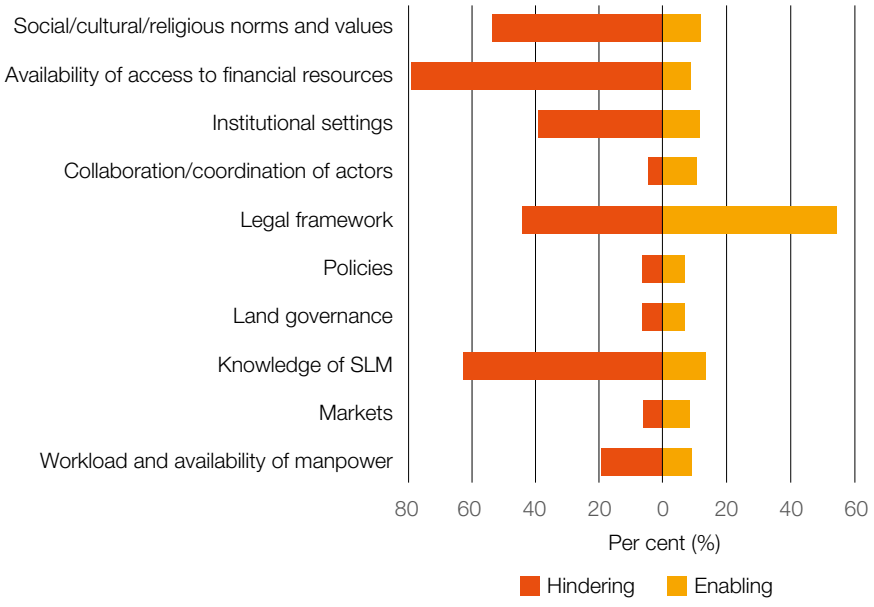
Challenges

There is an urgent need to scale up SLM practices among smallholders to achieve multiple short- and long-term benefits. These can be summarized as:

- Increasing yields and making production more secure and sustainable, while improving livelihoods and strengthening resilience
- Contributing to the evolution of sustainable food systems
- Achieving environmental benefits, which may not be smallholders' immediate priority
- Contributing to national targets, with SLM being the key to achieving land degradation neutrality, meeting Sustainable Development Goals and fulfilling nationally determined contribution targets.

Although the three countries covered by the grant differ in many ways, they also have common denominators. The first is the well-known and persistent constraints to the spread of SLM – articulated more than a quarter of a century ago by El-Swaify (1994). Among these are (i) the inadequate involvement of grass-roots society throughout the process; (ii) reluctance to adopt new technologies because they do not incorporate indigenous knowledge; (iii) the lack of adequate extension services; and (iv) an absence of national policies. That these remain obstacles to progress is underscored by an analysis of enabling and hindering factors derived from WOCAT's Global SLM Database. The main constraints identified in the database are the lack of financial resources and inadequate knowledge of SLM. In addition, an appropriate legal framework is viewed as essential to stimulate action (see figure 5).

FIGURE 5 Analysis of enabling and hindering factors for SLM implementation (499 approaches analysed)



Notes: Data were derived from WOCAT's questionnaire on SLM approaches, in which a specific question (question 2.9) asked whether specific factors enabled or hindered the implementation of SLM. Enabling and hindering conditions for the implementation of SLM show their relative importance over 233 examples. A lack of finance, knowledge and technical support strongly impeded action – these are serious constraints. Conversely, an appropriate legal framework was the top-ranking enabling factor.

Source: WOCAT Global SLM Database

The public extension services in each of the target countries were acknowledged as being weak, and there was a need to support and build the capacity of SLM, including for documentation of what works, how and why, in each context-specific situation, followed by scaling up identified and tested good practices through PFCAs. Digital tools have a rapidly emerging role within this process. The proliferation of smartphones, in particular, has opened up a whole range of new possibilities.

Context

All three countries have ratified the UNCCD; however, they present varying degrees of familiarity with SLM. Uganda has developed a national SLM platform, and has implemented many SLM projects and programmes that have included participatory approaches to SLM/natural resource management. Uganda also has a long-standing relationship with WOCAT. On the other hand, neither Cambodia nor the Lao People's Democratic Republic reported the same level of familiarity or experience with SLM when the grant was initiated. These two countries also have a language disadvantage, with so much literature in this field being written in English. Table 1 provides an overview of the extension status of the three countries, with key policy instruments and capacity gaps.

TABLE 1 Existing situation: extension services

	Extension status	Policy	Gaps
Cambodia	There is a national extension advisory committee (and similar committees at the provincial and local levels) The Royal University of Agriculture provides research and training The national-level IFAD Agriculture Services Programme for Innovation, Resilience and Extension assists smallholder agricultural services through farmer field schools, community extension workers and various pluralistic tools (with value chains, cooperatives, etc.)	The Cambodian Ministry of Agriculture, Forestry and Fisheries extension policy was established in 2015	There are gaps at all levels There is capacity for scaling up in PFCA-based knowledge generation, decision-making and selection
Lao People's Democratic Republic	The Ministry of Agriculture and Forestry has developed a national extension system The Department of Agricultural Extension and Cooperatives was established The smallholder adaptation to climate change component of the Southern Laos Food and Nutrition Security and Market Linkages Programme includes a role for community extension workers/lead farmers	The national extension system falls under the jurisdiction of the Ministry of Agriculture and Forestry The extension approach is set out in the National Agriculture and Forestry Extension Services report *Consolidating Extension in the Lao PDR* (2005)	There are gaps at all levels There is capacity for scaling up in PFCA-based knowledge generation, decision-making and selection
Uganda	The Uganda Forum for Agricultural Advisory Services was recently set up The Agricultural Technology and Agribusiness Advisory Service aims to improve research and extension Agricultural Extension has become the fourth Directorate of the Ugandan Ministry of Agriculture, Animal Industry and Fisheries The IFAD Project for Restoration of Livelihoods in the Northern Region works closely with the Agricultural Extension Directorate	The National Agricultural Extension Policy launched in 2016	There is some capacity for scaling up in PFCA-based knowledge generation, decision-making and selection

As demonstrated in tables 2 and 3, there are specific gaps in the capacity of farmers and agricultural extension services at all levels: provincial, district and community. Therefore, to scale up SLM practices, it is necessary to equip extension officials with an understanding of SLM and climate-smart technologies, as well as extension skills, to transfer this knowledge effectively.

In this context and in the face of these challenges, what is needed? The grant set out to build on "three aspects of innovation", namely (i) developing local knowledge; (ii) testing a participatory methodology; and (iii) documenting processes and knowledge. The aim was to demonstrate and guide activities in documentation, evaluation, decision support and sharing of SLM knowledge through participatory approaches – thereby creating hands-on experience among project officers. Thereafter, capacities were to be built on to expand outreach and adoption through capacity-enhanced agricultural extension services. The project design was also specifically intended to capture lessons that would help guide methodology development for implementation in future IFAD investment programmes.

TABLE 2 Farmers' SLM knowledge gaps, constraints and required responses: Cambodia

Factors challenging farmers to improve land management		**Considerations for project entry points**
Internal	**External**	
There is a lack of knowledge of agroforestry-based SLM	Some training materials are not easy for farmers to understand	The introduction of appropriate agroforestry-based practices is a priority
Families lack the labour power to scale up agricultural/SLM activities	Extension activities reach only a small proportion of farmers	Farmers need clear instructions on SLM
Conventional practices with low production levels remain the norm	There is a lack of water for irrigation due to droughts and poor infrastructure	Simple and visual extension products are of importance for farmers
The majority apply chemical fertilizers inappropriately	Climate change is altering rainfall patterns and causing droughts	WOCAT materials need to be simplified
There is poor motivation owing to insecure markets	Some new technologies are complicated and labour-intensive, such as the system of rice intensification	Building the capacity of commune extension workers and village volunteers is required
The majority of farmers are illiterate	Some extension campaigns are carried out at unsuitable times	The appropriate timing for extension activities needs to be taken into account
		New SLM technologies should focus on climate change adaptation/resilience

Source: Appraisal report, Cambodia (2016)

TABLE 3 Extension officials' knowledge gaps and training needs related to SLM: Cambodia

Stakeholders	**What are the knowledge gaps?**	**What do they need to do/on what should they be trained?**
Provincial Department of Agriculture, Forestry and Fisheries officials	• Skills in documenting and producing extension materials • Recent recruits have limited SLM knowledge and skills • Limited or no knowledge of WOCAT tools	• Capacity-building in relevant techniques • Tailored, in-service short courses • WOCAT tools and methods training
District Office of Agriculture, Forestry and Fisheries officials	• Not enough officials to cover district • Some need better extension skills • Limited ability to understand extension materials in English • Limited IT and documentation skills • Unaware of WOCAT tools and methods	• Training providing broad knowledge to cope with the currently limited number of staff • Extension skills enhancement • WOCAT tools and methods training – and in Khmer language • Capacity-building on producing standardized extension materials
Commune extension workers	• Technical knowledge of agronomy and SLM is limited • Extension skills remain limited for many • Limited ability to read materials in English • No experience of producing extension documents or videos; lack of IT skills • Unaware of WOCAT tools and methods	• WOCAT tools and methods training in Khmer language • Training in extension skills • Training in agronomy and SLM • Encourage commune extension workers to practise SLM themselves as models

Source: Appraisal report, Cambodia (2016)

Methodology for scaling up SLM with extension services and smallholder farmers

Introduction

The combination of WOCAT tools and methods for scaling up SLM with extension services and farmers was piloted. The methodology, focusing overall on a PFCA, is based on three components:

- Establishment of a knowledge base
- A decision support process
- Scaling up: outscaling and mainstreaming.

In general, the methodology and the process follow and are embedded in WOCAT's principles for knowledge management, as presented in box 3.

Before applying the methodology, an appraisal phase ensured that the methodology was building on what existed in and responded to the requirements of the specific situation. Thus, preparation in each country began with studying their extension systems and experience with SLM, and then defining knowledge gaps and needs. The needs of different actors, existing knowledge platforms, and past activities and products were reviewed. The WOCAT toolset and methodology was then applied, bearing in mind not only needs in terms of extension and SLM, but, importantly, the different types of partners (NGO, research or university).

Then, six main stages of the methodology within the three components were carried out. Annex 1 explains these stages and the other aspects of the methodology in detail.

BOX 3 WOCAT's principles for knowledge management

To enhance the robustness and durability of knowledge management processes and products, WOCAT promotes/focuses on the following principles:

- The tools and methods applied to generate data and evidence are harmonized
- Data are standardized to allow comparison and exchange
- Data and knowledge are open access, and easy to access and use
- Data and knowledge are integrated into platforms that last the duration of a programme/project
- Knowledge is co-developed and co-produced with multiple actors and social groups
- Data and knowledge are produced in such a way that they can be integrated into knowledge products for different audiences
- Knowledge/evidence is embedded at local, national, regional and global levels.

Choice of SLM practices for documentation, demonstration and scaling up

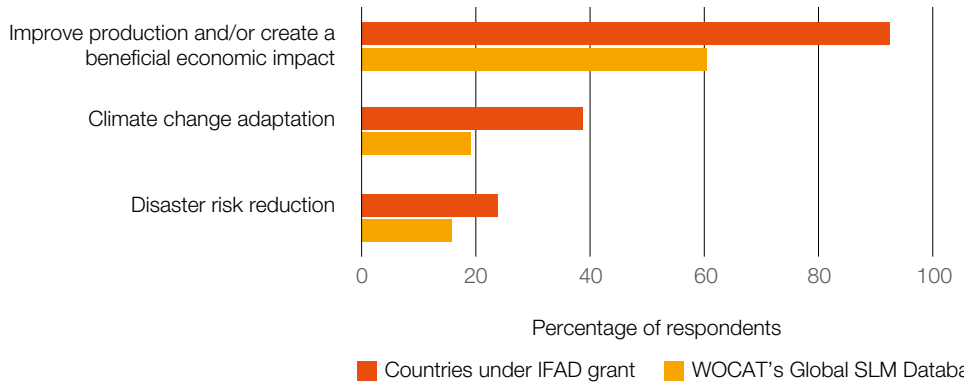
The SLM practices each country selected for documentation – for which the project design helped people articulate their clear preferences – centred on those that were affordable, cost-effective, practical and scalable for women and youth to invest in, to improve and stabilize production, to support livelihoods, to improve nutrition and to increase resilience to a changing climate. Each country set its specific criteria. For example, in Uganda, participants selected the criteria that were most important to them from the following list:

- Economic
  - Establishment and maintenance costs
  - Short- and long-term benefits
- Social
  - Workload for establishment
  - Workload for maintenance
- Ecological
  - Improved water harvesting
  - Increased soil moisture
  - Improved soil cover
  - Improved nutrient cycling/recharging
  - Increased soil organic matter/carbon sequestration
  - Decreased fire risks.

Analysis of the SLM practices selected

The identification and documentation process yielded a total of 119 SLM practices (109 SLM technologies and 10 approaches) in the three countries recorded in WOCAT's Global SLM Database (recommended by the UNCCD for best practice reporting). An analysis of what types of practices were chosen through this process yields important and pertinent information. One aspect of this – the main purpose of the technology according to the land user – is presented in figure 6; the same aspect from the Global SLM Database is shown for comparison.

FIGURE 6 Main purpose of the technology from the land users' perspective: a comparison of data from the three countries under the IFAD grant and the overall Global SLM Database



Notes: A total of 935 technologies were analysed from the Global SLM Database, which excluded the 109 technologies analysed under the grant (with which the 935 are compared). Percentage of respondents = the percentage of land users mentioning each purpose when a list of five answers were possible from a predetermined list. Thus, for example, just over 90 per cent of those land users documenting a technology under the grant said that the technology "improved production" and/or "created a beneficial economic impact", whereas just over 60 per cent of those reported in the Global SLM Database answered the same.

It is immediately clear that smallholders prioritized SLM practices that brought them direct benefits. Unsurprisingly, compared with the Global SLM Database as a whole – where any good SLM practice is documented – the PFCA applied in the grant was a powerful means of uncovering this subset of SLM practices: people chose practices that delivered well-being directly to their families, whether in terms of food or income. This further underlines the new general emphasis of SLM on production rather than simply conservation of soil. The percentage who mentioned climate change adaptation as a co-benefit and the percentage who felt that the practice would help in disaster risk reduction were also greater than those in the database at large. There is evidently growing awareness of these issues.

Looking at the typology of practices (based on a semi-quantitative assessment), roughly half of the SLM practices documented could be termed "mainly agronomic", a further one fifth are "animal husbandry-related", and only one in twenty would constitute classic activities based on "soil-conservation" or "soil and water conservation" structures. This again highlights the change in focus from soil conservation/soil and water conservation to SLM.

Crucially, this also means that SLM fits comfortably into the core discipline of mainstream agricultural extension officers. SLM is not dependent, as it was historically, on subject-matter specialists with a narrow focus on soil conservation engineering. This is good news for an extension-oriented SLM programme.

Examples of the SLM best practices selected, by country

To illustrate good examples of the practices prioritized, two are presented per country. Photographs show both the practices and the people. Details of these practices can be found in WOCAT's Global SLM Database, and links are given where relevant (e.g. organic vegetables in Cambodia).

For each practice, the spread of the technology is given, as is its origin – for example, projects or local innovation. Notes are included on the environment in which each practice is found. This includes rainfall, altitude (above sea level), average ground slope and the depth of the soils. The main purposes are summarized, and the SLM group under which each practice falls is provided: both of these are in accordance with WOCAT categorization. Finally, there is a note on long-term cost-benefit as perceived locally. These are split into benefit compared with establishment costs, and benefit compared with recurring maintenance costs. All of these data are as recorded on the ground and entered into the database.

Cambodia

Slurry from biogas plants as fertilizer

Slurry – or liquid manure – is an important by-product of biogas plants. Although biodigesters are primarily installed to produce methane gas for cooking or lighting, the cattle manure used in the process simultaneously yields slurry. This is a nutrient-rich, odourless source of plant nutrients. It is ideal for kitchen gardens. At the same time, it improves soil structure and increases soil organic matter.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_2137/
Spread of technology	10 ha
Introduction	Project intervention
Environment	Rainfall >1,000 mm, altitude <100 m above sea level, slopes 0-2 per cent, soils shallow
Main purposes	Improve production, address land degradation, preserve and improve biodiversity, mitigate climate change, have a positive economic impact
SLM group	Integrated crop-livestock management, energy efficiency technology
Cost-benefit (long-term)	Very positive compared with establishment and with maintenance

Slurry is produced as a by-product of a biogas plant. The household-level biodigester used in this example is a 5,000 litre plastic cylinder. To start up, the biodigester needs about 120 buckets (around 2,000 kg) of fresh cow manure and 120 buckets (1,200 litres) of water. It then takes one week for it to start producing gas – and slurry as fertilizer. After that, the farmer needs to add one bucket (around 20 kg) of fresh cow manure and one bucket (20 litres) of water every day. As a result, the farmer's family has gas for cooking, and they save the time they would spend collecting fuelwood. In addition, the farmer can use slurry from the biodigester as fertilizer for all kinds of crops, including bitter gourds, aubergines, mangoes, yardlong beans, rice and bamboo shoots. The slurry from the biodigester can be applied as a fertilizer in a liquid, semi-dry or dry form. It is nutritious for plants, does not smell and contains no weed seeds or parasites. Furthermore, it builds up soil structure and increases soil organic carbon.

Key points

- An important by-product from a renewable energy innovation.
- A rich source of nutrients for plants: ideal for kitchen vegetables.
- Produced close to the household where the biodigester is sited.
- Well-suited to production systems favoured by women.
- Biogas plants are increasingly being promoted by development agencies.

Cambodia
Organic vegetables

The cultivation of mixed organic vegetables – using natural fertilizers and homemade pesticides – not only reduces costs but also provides a product that is healthier to eat. Organic production is increasing globally as consumers become more concerned about their health, and they are prepared to pay a premium for this.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_3151/
Spread of technology	10 ha
Introduction	Projects and external interventions
Environment	Rainfall >1,000 mm, altitude <100 m above sea level, slopes 0-2 per cent, soils very deep
Main purposes	Improve production, preserve or improve biodiversity, have a positive economic impact, have a positive social impact
SLM group	Integrated soil fertility management, integrated pest and disease management, homegardens
Cost-benefit (long-term)	Very positive compared with establishment, positive compared with maintenance

The Cambodian Center for Study and Development in Agriculture has been promoting organic vegetable growing since 2004. Mrs Teav Chat is a leading organic vegetable grower – guided by the centre – and has won a national prize for her enterprise. Mrs Chat cultivates vegetables on an area of 7,000 square metres around her home. There is a large range of vegetables under cultivation (including lettuce, cucumbers, pak choi, spring onions, gourds, okra) and herbs as well. At the core of her production system is the use of cattle manure as a basis for "dry" compost. This is mixed with various organic by-products. She also uses liquid manure, based on cattle urine. Insecticides are concocted from chillies and other products. Mrs Chat receives an income throughout the year thanks to her diversified production.

Key points

- Organic production is relatively cheap, being based on local inputs.
- Diversification of vegetable produced ensures a regular income and is risk-aversive.
- Such systems are good for the environment and for people's health.
- This type of production is labour-intensive but popular among women.
- Organic vegetable production is being promoted by various development agencies.

Lao People's Democratic Republic

Broom grass to prevent erosion on slopes

This practice involves planting broom grass on steep slopes – and agricultural land – to prevent soil erosion and landslides. Broom grass has a rhizomatous root system that binds the soil and helps the grass to spread quickly. Farmers, especially women, generate income from the flowering head, which is cut and used for making brooms or brushes, hence its common name.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_2930/
Spread of technology	10 ha
Introduction	Land users' innovation
Environment	Rainfall 500-1,000 mm, altitude 100-500 m above sea level, slopes 3-5 per cent, soils deep
Main purposes	Address land degradation, conserve the ecosystem, reduce disaster risk, have a positive economic impact, have a positive social impact
SLM group	Rotational system, improve ground cover
Cost-benefit (long-term)	Very positive compared with establishment, neutral compared with maintenance

Broom grass (*Thysanolaena maxima*) is a tall, tufted indigenous grass that grows naturally along hillsides and in forests within tropical Asia. It has traditionally been harvested by women for its "brooms", which they can sell. However, this often requires a long trek to the forest. The practice described here involves planting rhizomes (horizontally growing roots), which then spread rapidly and form tall, tufted grass plants. The main reason to plant the grass is to prevent erosion and landslides, which are becoming an increasing problem, but it also allows harvest closer to the home. Typically, broom grass can be harvested two to three years after planting. Weeding is required before it becomes fully established. The main potential drawback is that it can invade the cropland through its vigorously spreading rhizomes.

Key points

- A cheap and effective method to prevent erosion and landslides.
- Dual purpose local grass which binds the soil and yields a commercial product.
- Popular with women who can gain an income without a long walk to the forest.
- While its potential has been reported by researchers, this is proof of effectiveness.
- A local innovation that is being adopted locally.

Lao People's Democratic Republic

Mulching vegetables with decomposed rice straw

This method of using decomposed rice straw as mulch for vegetables has been developed locally and provides multiple benefits. The mulch helps to conserve soil moisture, reduce splash erosion, increase soil organic matter and suppress weeds. Most importantly, the mulch improves yields by increasing soil fertility. It makes beneficial use of a local by-product.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_2061/
Spread of technology	10 ha
Introduction	Land users' innovation
Environment	Rainfall 1,500-3,000 mm, altitude 500-1,000 m above sea level, slopes 3-15 per cent, soils very shallow
Main purposes	Improve production, address land degradation, have a beneficial economic impact
SLM group	Improve ground cover, integrated pest and disease management, homegardens
Cost-benefit (long-term)	Positive compared with establishment and with maintenance

Farmers used to apply farmyard manure (from cattle and buffaloes). However, this appeared to increase the incidence of nematode infestation, so farmers experimented with alternatives. They noted that when rice straw had been left in rice paddies to rot, the following rice crop grew strongly there. So they began to store the rice straw post-harvest in areas that remained wet, and allowed it to break down and decay. After decomposition, the rice straw is chopped, mixed with soil and spread on the vegetable bed prior to sowing. The mulch is applied to a depth of approximately 5 cm, and the seedlings are then planted directly into the mulch. Common vegetables and herbs grown are cabbage and coriander.

Key points

- A cheap and effective method of improving crop yields.
- Based on a locally available by-product.
- Popular with women who gain from an increase in vegetable production.
- An example of an agronomic innovation with multiple co-benefits.
- An innovation in local terms – though variations are common worldwide.

Uganda
Beekeeping

Beekeeping is a traditional practice in the area, so there is basic knowledge of what to do. Improvements have been introduced and taught through extension. Although beekeeping may not be conventionally thought of as SLM, it contributes to improving biodiversity (by pollination) and necessitates maintenance of good vegetative cover to support the bees.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_2257/
Spread of technology	10 ha
Introduction	Land users' innovation, traditional practice
Environment	Rainfall 1,000-1,500 mm, altitude 500-1,500 m above sea level, slopes 3-5 per cent, soils moderately deep
Main purposes	Improve production, address land degradation, conserve the ecosystem, adapt to climate change, have a beneficial economic impact
SLM group	Agroforestry, beekeeping
Cost-benefit (long-term)	Slightly positive compared with establishment and with maintenance

Better beekeeping builds on a tradition in the area. The improvements include new beehives, bee suits, bee smokers and various utensils. These inputs require start-up investment. Prospective beekeepers are trained in various techniques to produce more and higher-quality honey for the market. They are taught where to site the hives, how to protect them from ants, how to maintain and repair damaged hives, and how – and when – to harvest honey. Training also extends to marketing assistance. Although not usually recognized as an SLM technology, beekeeping can contribute considerably to the health of the local ecosystem. Fire lines prevent the burning of grass and trees, and beekeepers are trained in maintaining diverse vegetation to support the bees. In turn, the bees help to improve crop harvests through pollination.

Key points

- Builds on a local tradition.
- A viable business model after start-up cost have been met.
- Popular with women, who can gain a regular income.
- Multiple environmental benefits from the need to maintain good vegetation.
- Requires very little land – thus viable for the poorest sections of society.

Uganda
Conservation basins

Conservation basins or "permanent planting pits" are a form of water harvesting that concentrate run-off water around annual crops. These basins are closely related to the *zaï* pits of Burkina Faso. By concentrating water, plants thrive in the basins. The basins only need to be re-dug every three years, by which time they have filled with sediment.

Database reference	https://qcat.wocat.net/en/wocat/technologies/view/technologies_3307/
Spread of technology	Unspecified
Introduction	Research advice, experiments
Environment	Rainfall 1,000-1,500 mm, altitude 1,000-1,500 m above sea level, slopes 3-5 per cent, soils shallow
Main purposes	Improve production, address land degradation, adapt to climate change, have a beneficial economic impact
SLM group	Water harvesting, surface water management
Cost-benefit (long-term)	Very positive compared with establishment and with maintenance

Conservation basins comprise a water-harvesting technique that is widely practised in the Sahel, notably in Burkina Faso (where they are called *zai*) and Niger (*tassa*). They have been well documented and publicized – by WOCAT and through other sources – and it is likely that these are the origin of the experimental practice in northern Uganda. Farmers were originally trained by extension agents but are now learning from one another. Widely spaced, relatively deep planting pits are dug to capture run-off. Farmers then use the pits as concentration points for fertilizer or manure, and this is where they seed the crop. Technical specifications have been established by researchers (e.g. the basins are about 15 × 35 cm wide and 15 cm deep). Construction is labour-intensive initially, but basins last up to three years before needing to be reconstructed. Crop yields improve, and harvests are protected in droughts.

Key points

- Effective and relatively cheap method of water harvesting for plant production.
- A proven method from West Africa: demonstrates potential of South-to-South learning.
- Can be used by women or men.
- Helps guard against drought and also protects land from erosion.
- Once farmers learn, the practice can be spread through farmer-to-farmer extension.

Lessons learned

Methodology: the ways and means to scale up SLM

1. It is clear that WOCAT's tools and procedures can be effective in supporting the scaling up of SLM extension support in different countries and contexts. The keys underpinning their success are (i) creating ownership; (ii) integrating farmers', SLM experts' and scientists' knowledge; (iii) facilitating a participatory, multistakeholder approach; and (iv) making sure that data are collected in a standardized format and are provided, analysed and shared through platforms and networks, reaching audiences from land users to policymakers.
2. Although WOCAT's Global SLM Database and/or a national SLM database is useful to extension staff at the national level, they can be very hard for district/community extension staff to access with limited internet connectivity. Translating the information into more accessible educational and communication materials, and into relevant languages, helps learning and implementation at the local level.
3. A participatory decision support process that focuses on gender, youth, equity, production, nutrition and building resilience, as well as cost-benefit, is the most effective approach for helping smallholders to identify locally adapted, scalable and durable SLM solutions. It fosters a sense of ownership. However, the methodology needs to be flexible and tailored to the local context.
4. Negotiation of selection and evaluation criteria for SLM by all stakeholders (farmers, extension agents and local decision makers) facilitates dialogue and encourages them all to speak, especially women and youth, and enables their voices to be heard. This process combats the still too common top-down process of instructing farmers on the basis of research station findings.

SLM: from "saving soil" to women's and men's livelihoods on the land

5. The methodology harvests a rich range of context-specific SLM practices, with clearly identified household and community benefits. The SLM practices that smallholders selected address their main concerns of production and economic gain. This greatly facilitates spread and adoption, makes participatory processes rewarding and ensures people engage in them with enthusiasm. Environmental co-benefits (carbon capture, hydrological function, improved biodiversity, etc.) that are rarely a priority for resource-poor land users are achieved as vital spin-offs. As other similar initiatives have shown, local innovation is stimulated at the same time. It also feeds favourably into extension services, which become armed with popular and positive messages. All of these directly address IFAD's core concerns.
6. It is evident that there are gains to be made from devoting particular attention to SLM practices that are gender-responsive to facilitate gender equality and empower women. An inclusive, participatory process helps to identify solutions that are particularly suitable for women. Diverse homegardens, the production of vegetables using compost or mulching, and beekeeping are examples of solutions producing revenue for women and supporting the environment at the same time. Demonstration sites, hosted by female farmers, can further support the spread of good practices among women. The SLM solutions can provide technologies for testing in farmer field schools.

Capacity-building: investing in people

7. To scale up SLM, and to ensure that it thrives after the project intervention phase, enhanced human capacity is needed at all levels. Although the grass-roots processes of identification, documentation and decision support workshops (in particular) are an education in themselves – demonstrating the power of experiential learning – this does not go far enough. More formal capacity-building is required, from local practitioners, to college and university students, to extension officers and more senior staff within ministries of agriculture (and extension), and on to IFAD country offices themselves.
8. Capacity-building at college and tertiary education levels is fundamental to strengthening extension systems through creating young specialists who are versed in participatory methodology and SLM. It has proved possible to establish SLM curricula (e.g. in Cambodia and Uganda) that fit into existing courses and thereby add to knowledge and capacity for future SLM implementation. Capacity-building is a sine qua non because, although the information (data, methodology, etc.) is available and has been documented, students do not have ready access to it, nor do they have teachers or mentors to guide them. Importantly, this might not come at an extra cost: many colleges and universities are increasingly receptive to new materials and content. A cadre of trained personnel can be created and will pass on their skills in turn.

Digitalization: moving with the times

9. There is a growing move towards using digital solutions in agriculture – although access to smartphones is still limited in many parts of the world. Following this trend, to enhance farmers' and extensionists' access to WOCAT's Global SLM Database through digital devices, and based on learning from the grant, WOCAT started a partnership with the tech start-up Farmbetter Ltd (Farmbetter, n.d.) in 2021. Their Farmbetter application matches smallholders with relevant SLM solutions – from the Global SLM Database – based on their farm profile to enhance their climate resilience. The Farmbetter application also helps to connect farmers with support, for example by sharing experiences and advice.
10. The younger generation of national professionals demonstrate enthusiasm for and skill with digital technologies. This was shown by the high quality of national platforms/websites set up, Facebook groups created and videos produced. However, there is a risk of a digital divide between the "haves" and the "have-nots", and a digital message is no substitute for learning directly from a fellow SLM practitioner about their experiences. Information and communication technology tools should therefore be built into and used within the existing participatory approach, and not be seen as an alternative.

Flexibility: different countries, diverse situations

11. This grant has highlighted the commonalities between countries as different as Cambodia, Lao People's Democratic Republic and Uganda. For example, all chose similar production-oriented SLM practices, although there are obvious differences depending on the agroclimatic zone, topography and farming system. One similarity is local participants' enthusiasm for the process; another is the shortage of resources for scaling up this work. But there are differences too. A key disparity is in the level of familiarity with these types of approaches to SLM and participatory methodology; another is in the language and terminology used.
12. Introducing a process that strengthens national agricultural extension with respect to SLM using WOCAT tools and methods is complex, varies considerably from country to country and requires a flexible approach. It also takes time. There needs to be a careful selection of agencies, and there is no single model that will fit all. Universities, research institutes and NGOs all have their comparative advantages and drawbacks. We need to understand the context before developing a system that targets the most appropriate partner(s) and refines the methodology accordingly.

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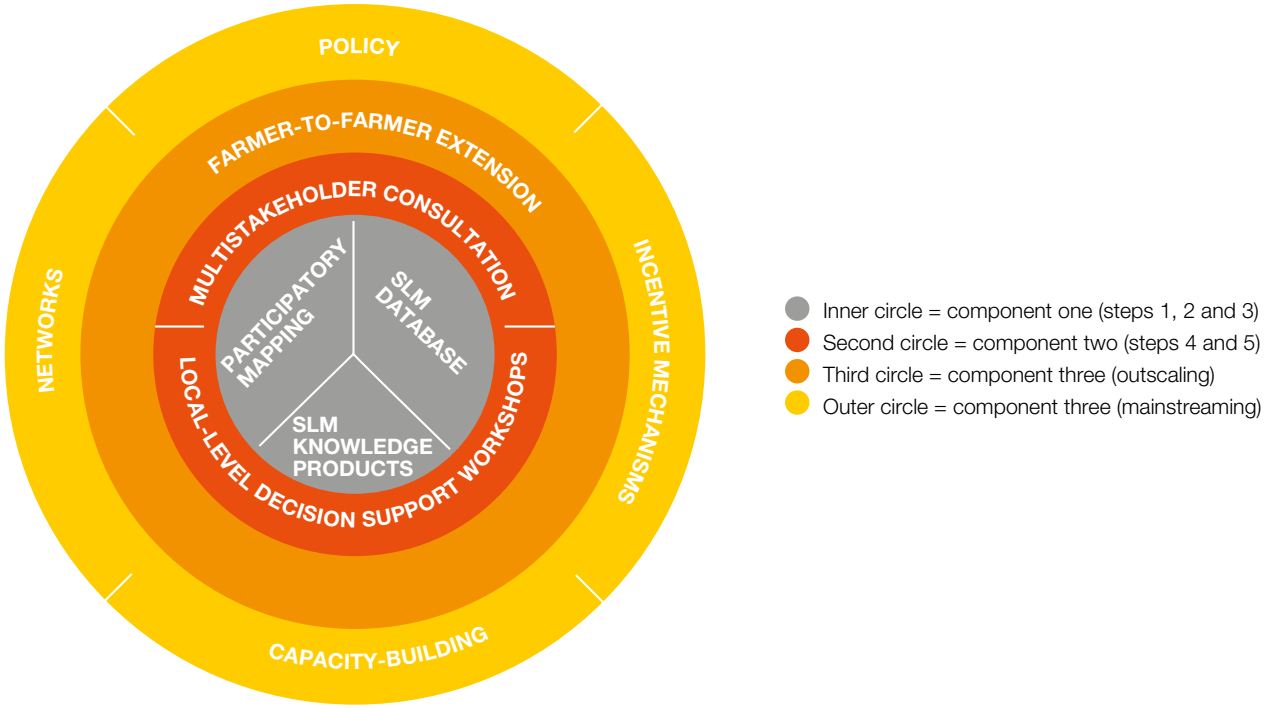
Annex 1
Methodological steps in detail

Introduction

Building on the introduction in chapter 3, the detail of the methodological steps is conceptualized in figure A1. Box A1 presents some notes on comparative methodologies – each with slightly different emphases, but with the common goal of scaling up sustainable land management (SLM).

FIGURE A1 The methodology



BOX A1 Comparative methodologies: the examples of stimulating community initiatives in SLM and PROmoting Local INNOVAtion in ecologically-oriented agriculture and natural resource management

Similar overall approaches towards identifying and spreading local SLM practices have been used by other projects.

PROmoting Local INNOVAtion in ecologically-oriented agriculture and natural resource management – which is active in Cambodia and Uganda (and has historically received support from IFAD) – recognizes local initiatives in the field of agriculture and natural resource management (Prolinnova, n.d.). However, it emphasizes "participatory innovation development", in which researchers and others help to add value to local innovation through jointly tested improvements.

Stimulating Community Initiatives in Sustainable Land Management was a United Nations Environment Programme-Global Environment Facility project spanning Ghana, Morocco, South Africa and Uganda. Its focus was community innovation (thus often involving common resources), and the key methodological difference between it and most comparative community-focused projects was establishing channels for direct South-South learning. Both the lessons learned and methodology refined (which separate field activities from programme development) are pertinent to the current exercise (see Mudhara et al., 2016).

Components and steps

Details of the methodological steps now follow, grouped under the project components.

Component 1: establishment of a knowledge base

The establishment of a platform and repository of knowledge and information forms the groundwork for the actions that follow, thus enabling access to and dissemination of evidence and dialogue. The steps of component 1 are as follows.

Step 1: participatory mapping of land degradation hotspots and SLM good practices

- Multistakeholder local workshops to identify main land degradation problems, hotspots of degradation in target areas and "green spots"/inventory of existing SLM solutions (WOCAT, n.d.a) (see figure A2)
- Screening of suitable practices in the World Overview of Conservation Approaches and Technologies (WOCAT) Global SLM Database (see box A2)
- Mixing and matching local practices with those in the database
- Multistakeholder consultation at the national level to present inventories and select SLM practices for documentation.

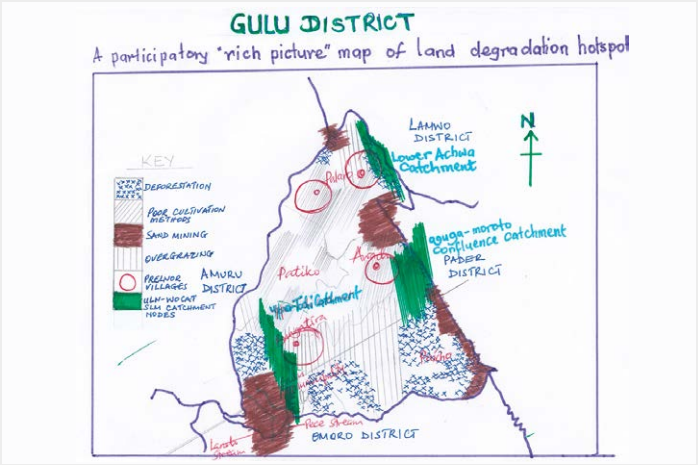
BOX A2 WOCAT's Global SLM Database

WOCAT's Global SLM Database is the primary database the United Nations Convention to Combat Desertification (UNCCD) recommends for SLM best practices and adaptation measures. Its main features are:

- Free access to more than 2,000 proven, field-tested SLM practices from over 130 countries
- Free upload and worldwide sharing of good SLM practices in Chinese, English, French, Russian, Spanish and other languages
- A database filter to find relevant SLM practices for specific landscapes and land uses
- The possibility to link to other global or national platforms through its application programming interface (e.g. the Framework for Ecosystem Restoration Monitoring, and the UNCCD drought toolbox).

FIGURE A2 Participatory mapping of land degradation and SLM

The process of mapping in Lao People's Democratic Republic



A community-drawn map of land degradation hotspots from Uganda

Step 2: training of documenters and documentation of SLM practices

- Training in application of WOCAT tools for documenting SLM practices
- Documentation of SLM technologies and approaches with the WOCAT SLM questionnaires in the field – these are participatory, with farmers, extension agents and SLM specialists (WOCAT, n.d.(b))
- Entering questionnaire data into WOCAT's Global SLM Database (see box A2)
- Review by key national SLM personnel working closely with UNCCD focal points
- Global review and quality assurance by WOCAT, then data published in WOCAT's Global SLM Database and national databases/platforms (linkage through application programming interface or simple integration of link).

Step 3: development of SLM databases and knowledge products for different audiences

- Good practice collections/compilations for the country, including in local languages (see figure A3)
- Leaflets, fact sheets and posters for extension and farmers' groups
- Calendars for farmers and extension
- Videos (shown on national TV and promoted on national and global platforms)
- Radio programmes – storytelling for local communities
- Policy briefs.

Component 2: evidence-based decision support

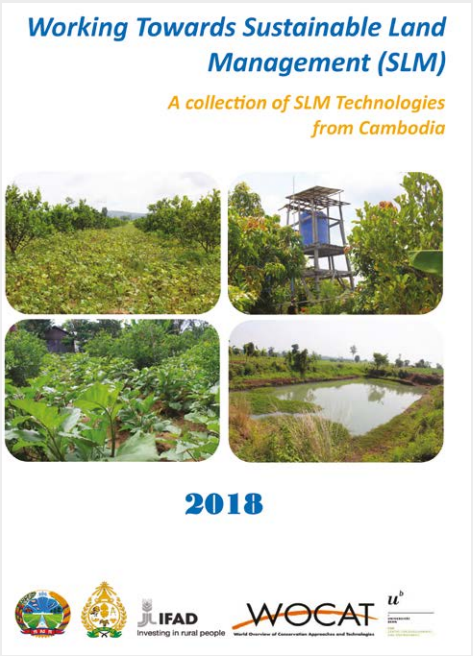
Decision support is a crucial part of the methodology, helping people decide which SLM technologies are appropriate for them. The steps of component 2 are as follows.

Step 4: multistakeholder consultations

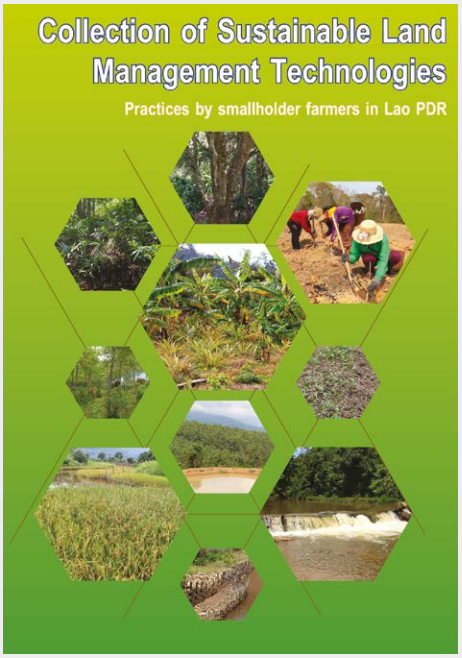
The purpose of these consultations is to assess the evidence available from documented SLM practices, and to preselect suitable SLM technologies/technology groups to be discussed and used in local-level decision support workshops.

FIGURE A3 Compilations of good practices

Uganda



Cambodia



Lao People's Democratic Republic

Sources: Uganda – (WOCAT, n.d.(c)); Cambodia – (WOCAT, n.d.(d)); and Lao People's Democratic Republic – (WOCAT, n.d.(e))
Note: Both English and local language versions are available for Cambodia and Lao People's Democratic Republic.

Step 5: local-level decision support workshops

To facilitate informed SLM decision-making at the local level, WOCAT has developed framework guidelines for the implementation of participatory decision support stakeholder workshops (Bachmann et al., 2018; WOCAT, n.d.(f)). The objectives of the two-day workshop are to:

- Jointly assess and select relevant SLM technologies for promotion on demonstration plots, in farmer-to-farmer exchange and through training – while giving a voice to all social groups, including youth and women
- Strengthen trust, dialogue and collaboration among the stakeholders involved.

The participatory, evidence-based decision support workshops, using weighted scoring methods, act as the main filters to make sure that the SLM practices meet the criteria and needs of farmers and other groups.

Women and youth were integral parts of these decision support workshops. Box A3 illustrates how gender-sensitivity was built into the decision-making process. It must be re-emphasized that the appropriateness of SLM technologies is not simply a question of technical effectiveness or economic efficiency. It has to match with those who are going to bear the burden of implementation: does it match their capabilities, and, just as importantly, does it deliver what they want?

FIGURE A4 Discussions about potential SLM technologies

Discussions about potential SLM technologies based on documented evidence

FIGURE A5 SLM technologies workshop in Cambodia

A workshop facilitator from the Royal University of Agriculture Center for Agricultural and Environmental Studies, with the SLM technologies scoring matrix in the background

BOX A3 Gender: the voices of women in decision-making

The participatory decision support workshop is a tool to support the equitable selection of SLM technologies to be implemented. In the three countries, one third of the participants of the decision support workshops were women. Depending on the local context, decision support workshops were carried out with male and female farmers attending together, or with women and men separately (e.g. by carrying out a separate decision support workshop with a women's group), to optimize the voice of both genders in the decision-making process and prioritize scaling up technologies that are appropriate for different social groups.

A participatory decision support workshop with a women's group in Cambodia

Component 3: scaling up

Step 6: outscaling and mainstreaming activities

Outscaling (i.e. activities to spread SLM solutions and achieve greater uptake) focused on farmer-to-farmer learning. The SLM technologies selected as priorities through the decision support process were implemented in demonstration plots that were established in collaboration with extension services, local partners and IFAD-supported loan projects in each country to ensure their continued existence and utilization after project completion. This included practices being fed into farmer field schools. Multiple specific criteria were used to select farmers in each country. The criteria were developed by the national partners in collaboration with various stakeholders. Some of these were:

Cambodia

- Only farmers who participated in the decision support workshop and wanted to share their knowledge with others
- Farmers facing types of land degradation identified in the decision support workshops
- Those with a plot of land appropriate for a demo site and readily visible to others

Lao People's Democratic Republic

- Joint selection of host farmers jointly selected by the village head, village committee, women's union and land users
- Host farmers must visit the locations where the selected practices had been documented
- An obligation to learn first-hand from the champion farmers who implemented these good practices

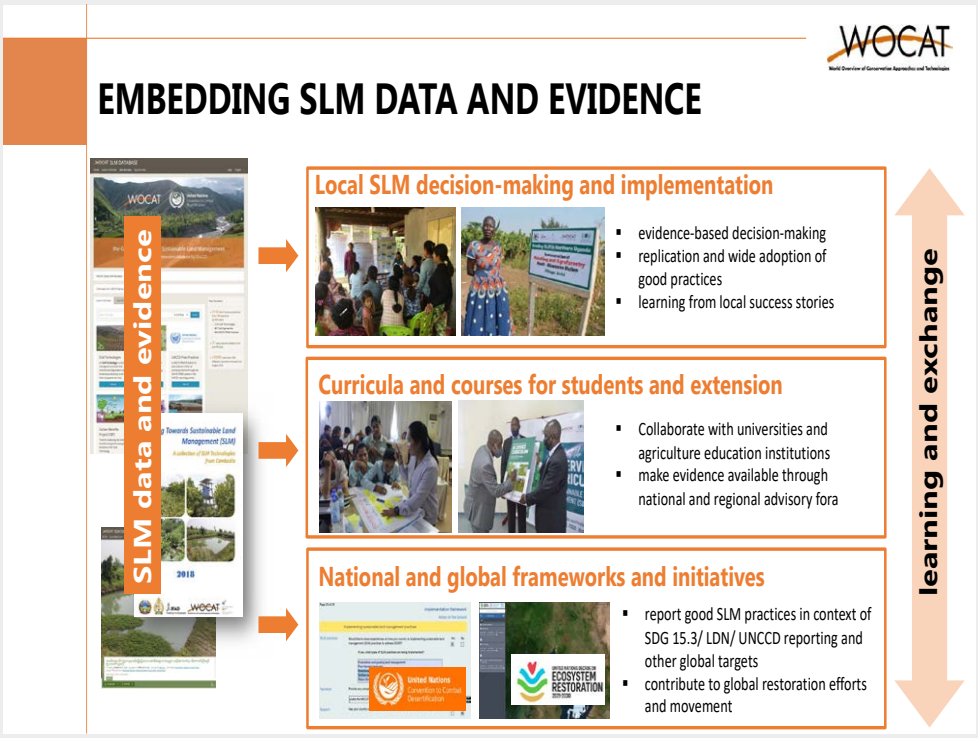
Uganda

- Gender consideration – special consideration given to women and youth
- Farmers with at least one acre (0.4 ha) of land for demonstration
- Location representation – upper slope, mid-slope and lower slope.

Mainstreaming (i.e. activities to institutionalize SLM and related tools and methods, and improve its sustainability) is tailored to the specific needs of each country, but there needs to be stronger regional/international initiatives as well. The fundamental point here is that project interventions can only kick-start processes. Without mainstreaming into permanent institutions, building up human capacity and developing networks, there is seldom sustained action: usually what has been achieved proves ephemeral and fades away. Thus, mainstreaming is crucial to ensure long-term sustainability, and the following are some of the most important components:

- Establishing **communities of practice** at the local level: exchanging experience on what has worked, where and why
- **Capacity development** in SLM: within governmental institutions and at the agricultural college/university level
- **Networks and exchange**: setting up national SLM networks with the associated, easily accessible knowledge platform and WOCAT-established regional clusters through which national networks come together and knowledge on best practices is exchanged
- **Mainstreaming knowledge products, tools and methods**: within countries, but also at regional (e.g. African Forum for Agricultural Advisory Services) and international (e.g. UNCCD) levels to reap the benefits of South-South learning.

FIGURE A6 Example of methodology from Cambodia



The integration of SLM data and evidence into decision-making processes at the farm/household level, and their use for educational purposes and global reporting

Application of the methodology in the three countries: local lessons learned

The guidelines are generic and form a framework around exercises that are adapted to the specific country/project context. Therefore, the following differences were considered:

- Cambodia: the target area comprised mainly flat areas, with a mosaic of small farms
- Lao People's Democratic Republic: watersheds were steep, with upstream-downstream differences in land use and conservation status
- Uganda: the area was characterized by a post-war situation and internally displaced people

Each country applied a methodology tailored to the specific context (table A1).

TABLE A1 Summary of experiences with implementation of methodology, by country/institution*

	Cambodia Center for Agricultural and Environmental Studies at the Royal University of Agriculture	**Lao People Democratic Republic** National Agriculture and Forestry Research Institute	**Uganda** Landcare Network (NGO)	**Lessons learned**
Background: comparative competence	Training capacity, but participatory methodology experience lacking	Local-level presence, but participatory methodology experience lacking	Experienced in various forms of participatory methodology, including WOCAT	Basic methodology needs to be tailored to every country's situation, building on existing/potential capacities, knowledge bases and SLM green spots
Component 1: knowledge base				
Step 1: participatory mapping	Flat landscapes: needed to identify potential combinations of SLM technologies	Steep terrain: situation depends on farm location	Landscapes made complex by previous conflict, three zones defined: upper slope, mid-slope and lower slope	Understanding of the landscape by all actors essential for mapping: understanding types of land degradation in the landscape and which SLM is relevant
Step 2: WOCAT questionnaires and database: training and documentation	Training Royal University of Agriculture staff and training of trainers, with extension at the province level and with IFAD investment programme staff	Training of National Agriculture and Forestry Research Institute staff and training of trainers, with extension at the province level and with IFAD investment programme staff	Training of Uganda Landcare Network and training of trainers, with extension at the district level and with IFAD investment programme staff	Collaboration between researchers, extension, experts, IFAD investment loan project and land users for the best results
Step 3: knowledge products	Good practices collection in Khmer and English, SLM posters for extension, videos Good SLM practices included in 2017-2018 UNCCD reporting National website: http://camcat.rua.edu.kh/index.php/pages/new_page/16	Good practices collection in Lao and English, videos and materials in Lao used at farmers' fairs Tolakong: SLM narration in villages through village broadcast National website: http://laocat.nafri.org.la/	Good practices collection in English, simple good practices folders for different SLM technology groups widely disseminated Radio programmes on different SLM technologies broadcast National website: www.ugacat.ug/	Standardized documentation supports the application and integration of knowledge into products for different audiences Presentation of good practices in local language is essential, whereas English helps sharing at the regional and global levels
Component 2: decision support				
Step 4: multistakeholder consultation	Consider government/extension expertise and priorities when selecting SLM technologies to document	Build on existing expertise from projects and programmes, and include innovations in the documentation	Consider government/extension expertise and priorities when selecting SLM technologies to document	Include different views on and experiences of good practices to select a multitude of SLM technologies to document, offering different opportunities for land users
Step 5: local-level decision support **Final SLM technology selection**	Separate decision support workshops with women, men and mixed gender 11 technologies selected, focusing on agroforestry, crop management, homegardens and integrated farming systems, manuring and composting, and water harvesting and management	Mixed gender decision support workshops 14 technologies selected, focusing on water harvesting and management, soil erosion prevention, soil fertility improvement, livestock management, and agroforestry and intercropping	Separate decision support workshops with women, men and mixed gender 12 technologies selected, focusing on water management, soil fertility and agronomic practices, soil and water conservation practices, and afforestation and trees on farms	Group setting of main criteria and scoring of SLM technologies in a participatory manner facilitates the selection of technologies that are of true importance and interest to female and male farmers

	Cambodia	Lao People Democratic Republic	Uganda	Lessons learned
Component 3: outscaling and mainstreaming				
Step 6a: outscaling – farmer-to-farmer extension	48 demonstration sites established, supported by community extension workers through the Provincial Department of Agriculture Farmer field days, visiting demonstration sites	14 demonstration sites established in collaboration with the Southern Laos Food and Nutrition Security and Market Linkages Programme's smallholder adaptation to climate change component Famer-to-farmer exchange visits organized with district and provincial extension services and support given to farmers with production inputs to implement SLM	28 demonstration sites, hosted by community groups Demonstration sites – attractive to young/female farmers – embedded in the Project for Restoration of Livelihoods in the Northern Region and handed over to the Ministry of Local Government for long-term management of the sites Farmer-to-farmer exchange visits and support given to farmers to implement SLM	Guarantee longevity of demonstration sites by handing over to relevant local partners
Step 6b: mainstreaming – curriculum development and training of students, policy-level work and national WOCAT initiatives	Incorporating SLM knowledge and WOCAT tools into the curricula of the Royal University of Agriculture and other higher education institutes to train the younger generations National expert group guiding the project included main SLM actors at the national level, such as the UNCCD focal points Participation of project team in delegation for UNCCD Conference of the Parties 14 (India, 2019) WOCAT Cambodia established and included under WOCAT umbrella, ensuring continued interaction with the WOCAT network and partners in the region	National expert group guiding the project included main SLM actors at the national level Policy messages on scaling up presented to and discussed with decision makers (see Keoka et al., n.d.) WOCAT Lao People's Democratic Republic established (see Cambodia)	SLM curriculum for extension initiated at agricultural college Memorandum of understanding with African Forum for Agricultural Advisory Services to further scale up tools and methods for extension services WOCAT Uganda integrated into national SLM platform WOCAT Uganda established (see Cambodia)	Establishing a network of SLM actors, linking them at the national, regional and global levels, to facilitate continued exchange and interaction beyond project's and programme's lifespans

*The WOCAT services brochure gives indicative numbers of days required for key methodological activities (see annex 2; also available at www.wocat.net/library/media/253/).

Annex 2
WOCAT services

The WOCAT services brochure, reproduced below, outlines the three key services that WOCAT performs. These are documenting SLM, searching and selecting SLM options, and mapping problems and progress (WOCAT, 2021).

WOCAT SERVICES

Knowledge Management and Decision support for Sustainable Land Management

March 2021

Local-level decision support for Sustainable Land Management in Gulu, Uganda. © Uganda Landcare Network

WOCAT is the global network for Sustainable Land Management (SLM) and hosts the Global Database on SLM Practices – as recommended by the United Nations Convention to Combat Desertification (UNCCD).[1] Over the past 28 years, WOCAT and its partners have developed a set of standardized tools and methods for SLM knowledge management and decision support. These are now used in over 50 countries around the globe. The availability of standardized data facilitates comparative analysis across projects, programmes and countries.

WOCAT provides a robust basis for evidence-based decision-making in SLM mainstreaming and scaling out to **improve production, attain land degradation neutrality, increase climate resilience and help in ecosystem restoration.**

WOCAT partners with institutions in programmes and projects, or is contracted by national or international clients to implement services. The main target group comprises agriculture/ environment officers, SLM/ Natural Resource Management (NRM) staff, UNCCD focal points, science and technology correspondents and their staff, and researchers.

An **overview of its three key services** is provided in the tables that follow.

WOCAT in a nutshell

- *Offers physical and online training and tools for the whole programme cycle of planning, implementation, review and evaluation.*
- *Provides a standardised way to document SLM knowledge and hosts a comprehensive database.*
- *Assists agencies to select SLM measures and to choose options to promote wide adoption and spread.*
- *Shows how SLM supports land degradation efforts, NRM, watershed management, climate change action, ecosystem restoration and sustainable production.*

[1] https://knowledge.unccd.int/knowledge-products-and-pillars/best-practices-sustainable-land-management/about-unccd-wocat

Documenting SLM

Compilation and production of standardized SLM knowledge

WOCAT offers a toolset for standardized and systematized SLM data collection, compilation, storage and presentation as well as knowledge production. This facilitates local, national, regional and global knowledge sharing and analysis of which good practices work where, how and why, and what are their costs and benefits. Such knowledge forms the basis for evidence-based SLM decision-making.

Service	For what	Related tools and methods	Duration (average days)[2]
SLM Technologies and Approaches documentation online/ physical training *Option for individuals/ small group: in-service training*	• Application of WOCAT SLM Technologies (Ts) and Approaches (As) inventory and questionnaires and related Global WOCAT SLM Database to document and evaluate SLM practices in a standardized format • Systematic knowledge sharing at national, regional and global level • SLM best practices reporting to the UNCCD • Assessment of SLM good practices	• Quick inventory of SLM Ts and As www.wocat.net/library/media/44/ • Questionnaires SLM Ts www.wocat.net/library/media/15/ • Questionnaires SLM As www.wocat.net/library/media/16/ • Global WOCAT SLM Database https://qcat.wocat.net/ • WOCAT training materials www.wocat.net/library/media/63/	**Total 11–12 days** (4-5 days preparation; 5 days training; 2 days follow-up)
SLM Technologies and Approaches data review and quality assurance	• Cyclical process of review and quality assurance of SLM data submitted in the Database • Self-learning	• Explanation of review process https://qcat.wocat.net/en/wocat/help/questionnaire/	**0.5–1 day** per SLM Technology/ Approach (costs apply for projects with earmarked funding)
SLM good practices overview publication	• Compilation of good SLM practices for an overview of existing practices at all levels • English and/ or local language (if the Database is translated)	• SLM Ts and As summaries automatically generated in the Database used for the overview www.wocat.net/library/media/64/	support based on demand/ client specific requirements
SLM learning and communication materials	• User-friendly materials (flyers, brochures, calendars, short videos) tailored to practitioners, extension services and land users	Example: • SLM video Uganda https://www.wocat.net/library/media/224/ • Learning materials Philippines www.wocat.net/library/media/167/ • SLM Calendar Cambodia https://www.wocat.net/library/media/141/	support based on demand/ client specific requirements
Linking national SLM databases/ platforms to the Global WOCAT SLM Database	• Application Programming Interface (API) of the Database facilitates linking to national SLM databases/ platforms, enabling national to global standardized knowledge sharing and exchange between countries	• API documentation https://qcat.wocat.net/en/api/docs/	**2–3 days** (support for using API)
Carbon Benefits Project (CBP) online/ physical training	• Estimation of the carbon benefits of SLM Technologies using the CBP tools, which are linked to the SLM Ts Questionnaire	• Carbon Benefits Project website https://banr.nrel.colostate.edu/CBP/	**Total 11–12 days** (4–5 days preparation; 5 days training; 2 days follow-up)
In-service support for CBP tools application	• Baseline data collection including spatial data, development of business as usual and intervention scenarios, data assemby in the CBP tools • Running CBP tools for detailed and summary report and interpreting output		support based on demand/ client specific requirements
Climate Change Adaptation (CCA) online/ physical training	• Application of CCA Module as a supplement to the SLM Ts Questionnaire to assess SLM Ts adaptation to gradual and extreme climate change	• Climate Change Adaptation Questionnaire www.wocat.net/library/media/17/	**Total 5 days** (2 days preparation, 2 days training; 1 day follow-up)

[2] Institutional costs if implemented by global North/ international partners are 1'100 USD/ day incl. overheads. Institutional costs of global South/ national partners depend on the partner and country. Travel and DSA are to be added.

Searching and selecting SLM options

Decision Support for mainstreaming and scaling out SLM

WOCAT provides assistance in mainstreaming and institutionalizing SLM into decision-making processes so that policies, investments, planning, and technical assistance are supporting durable SLM implementation and scaling out beyond the programme or project level. WOCAT facilitates inclusive, participatory decision-making processes grounded in evidence about land degradation and SLM where the most suitable solutions are negotiated amongst stakeholders.

Service	For what	Related tools and methods	Duration (average days)[2]
Decision support framework (DSF) for SLM mainstreaming and scaling out – put in practice	• Embed land degradation (LD) and SLM data to facilitate evidence-based decision-making • Mainstream and scale out SLM at local, sub-national and national level and create an enabling environment for Land Degradation Neutrality (LDN)	• Description of the DSF www.wocat.net/en/decision-support-slm	support based on demand/ client specific requirements
SLM mainstreaming and scaling out strategy design and realization	• Participatory, multi-stakeholder approach for a SLM mainstreaming and scaling out strategy • Identification of barriers and opportunities and key decision-making processes and instruments	• SLM mainstreaming tool https://www.wocat.net/library/media/170/	Basic design: 3 weeks; advanced design and realization support: over a period of several months
Local level participatory SLM decision support training	• Application of WOCAT Guidelines for local level participatory stakeholder workshops for inclusive selection of SLM practices. Joint identification of relevant criteria for different stakeholder groups and negotiation of solutions, developing trust and ownership for SLM adoption	• Short description of the methodology www.wocat.net/en/decision-support-slm • Guidelines are available on request	**Total 7 days** (3 days preparation; 3 days training, 1 day follow up)
National level stakeholder workshop for selection of priority areas for intervention training	• Participatory consultation about existing LD and SLM, hot spots of LD, existing/ promising SLM solutions for different land use systems for evidence-based, negotiated selection of priority areas	• Guidelines are available on request	**Total 5 days** (2 days preparation; 2 days training, 1 day follow up)

Mapping problems and progress

Spatial assessment of land degradation and SLM in the context of Land Degradation Neutrality

Spatial tools help to assess the spread, distribution, characteristics and trend of land degradation and SLM for different land use systems at district, province, country or regional level. Based on this evidence, hot spots of degradation and green spots of successful SLM are defined, and areas for intervention can be prioritized. An evaluation of the status and impacts of land degradation and SLM or the development of different land management scenarios facilitates the design and planning of suitable actions to reverse, reduce and avoid land degradation in the context of land degradation neutrality, reduced disaster risk and enhanced ecosystem resilience.

Service	For what	Related tools and methods	Duration (average days)
Mapping land degradation (LD) and SLM online/ physical training	• Application of the LADA-WOCAT Questionnaire on mapping LD and SLM (QM) to determine the spread, extent, causes and impacts of LD/ SLM in watersheds up to country levels through expert assessment • Creation of (sub-)national maps of LD hot spots and SLM bright spots for evidence-based planning and decision-making	• Questionnaire on Mapping LD and SLM (QM) www.wocat.net/library/media/18/	**Total 6 days** (2 days preparation; 3 days training; 1 day follow-up)
In-service support for LD and SLM maps production and application	• Support for data collection, analysis and production of final LD and SLM status, causes and impacts maps for major land use systems • Application of maps for land use planning, LDN monitoring and reporting • Data storage and sharing		support based on demand/ client specific requirements
Land Degradation Neutrality (LDN) monitoring and 'validation'	A series of services that support: • Assessment of LD and SLM trends and monitoring of impacts • LDN reporting/ monitoring • Ground truthing of LDN indicators/ results • Use of different tools for validation		
A) Mapping LDN indicators online/ physical training	• Introductory QGIS online/ physical training as a basis for using plugins (e.g. Trends.Earth) and creating maps • Map and calculate the three LDN change of state indicators (Land Productivity Dynamics, Land Cover Changes, Soil Organic Carbon trends) with default and alternative methods and data sources • Obtain SDG 15.3.1 indicator map (land under degradation) with Trends.Earth • Create alternative Land Productivity Trends Maps with satellite-derived data and understand its importance and limitations as an indicator of LDN	• QGIS and Trends.Earth Tutorials https://www.wocat.net/library/media/242/	**Total 6 days** (2 day preparation; 3-days training; 1 day follow-up)
B) Google Earth Engine (GEE) online/ physical training	• Introduction to accessing, using and analysing spatial data available in GEE relevant for LDN • Strategies to map land cover and productivity trends at national and subnational level integrating satellite-derived data, field data / expert knowledge in GEE	• Google Earth Engine for LDN presentation https://www.wocat.net/library/media/242/	**Total 6 days** (2 day preparation; 3-days training; 1 day follow-up)

C) National level stakeholder workshop for LDN validation and ground truthing	• Compare satellite-driven information with expert knowledge derived from a participatory approach • Consensus mapping to select the most representative maps of land productivity and degradation trend • Produce, compare and validate maps to obtain error adjusted area estimates of degradation	• For further reading, example from Argentina: https://www.wocat.net/documents/978/Topic_2_Combining_earth_observation_and_expert_knowledge_Cesar_Luis_Garcia_CONICET.pdf	support based on demand/ client specific requirements
D) Support the creation of a Geospatial Knowledge Base and related decision support systems for LDN	• Support the creation of various systems to fit the partners' needs regarding LDN data storage, management and monitoring systems • Create platforms and applications to share and analyse data in order to support decisions during implementation, monitoring or reporting LDN related targets	• Examples can be provided on request	support based on demand/ client specific requirements

Documentation of SLM Technologies in Morocco. © Donia Jendoubi

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