

# APPRAISING AND SELECTING CONSERVATION MEASURES TO MITIGATE DESERTIFICATION AND LAND DEGRADATION BASED ON STAKEHOLDER PARTICIPATION AND GLOBAL BEST PRACTICES

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## ABSTRACT

Most desertification research focuses on degradation assessments without putting sufficient emphasis on prevention and mitigation strategies, although the concept of sustainable land management (SLM) is increasingly being acknowledged. A variety of already applied conservation measures exist at the local level, but they are not adequately recognised, evaluated and shared, either by land users, technicians, researchers, or policy makers. Likewise, collaboration between research and implementation is often insufficient. The aim of this paper is to present a new methodology for a participatory process of appraising and selecting desertification mitigation strategies, and to present first experiences from its application in the EU-funded DESIRE project. The methodology combines a collective learning and decision approach with the use of evaluated global best practices. In three parts, it moves through a concise process, starting with identifying land degradation and locally applied solutions in a stakeholder workshop, leading to assessing local solutions with a standardised evaluation tool, and ending with jointly selecting promising strategies for implementation with the help of a decision support tool. The methodology is currently being applied in 16 study sites. Preliminary analysis from the application of the first part of the methodology shows that the initial stakeholder workshop results in a good basis for stakeholder cooperation, and in promising land conservation practices for further assessment. Study site research teams appreciated the valuable results, as burning issues and promising options emerged from joint reflection. The methodology is suitable to initiate mutual learning among different stakeholder groups and to integrate local and scientific knowledge. Copyright © 2009 John Wiley & Sons, Ltd.

**KEY WORDS:** conservation measures; desertification; stakeholder workshop; learning; sustainable land management (SLM); best practices; decision support; EU

## INTRODUCTION

Agricultural advisors in desertification-prone areas are often confronted with the need to find ways to improve land and water productivity in order to support the land users in their local area. How and where can they find best practices or proven strategies to reduce water losses through runoff or evaporation for example? Where can they get new ideas? And how can they proceed in appraising and selecting such identified best options, ideally together with the stakeholders, in order to enhance ownership, feasibility and applicability? These were the questions driving the research presented here.

Over the recent decades, extensive research efforts have been undertaken to assess the extent and physical processes of land degradation and desertification (Stocking and Murnaghan, 2001; Dregne, 2002, Nachtergaele and Licona-Manzur, 2008). While adding essential insights into causes and impacts of desertification and producing

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scientific recommendations, the overall output has tended to be too fragmented for practical decision support, policy-making and implementation at the local farm level (Engelen, 2003). More recently, research and implementation have focused on sustainable land management (SLM), making it an acknowledged and widely promoted concept (Hurni *et al.*, 2006; World Bank, 2006; IAASTD, 2008), increasingly also being recognised as a means to tackle desertification (Thomas, 2008). SLM involves soil, water, and vegetation adequately supporting land-based production systems for current and future generations. Its key principles are: productivity and protection of natural resources, economic viability, and social acceptance. However, despite numerous local and global efforts, desertification and land degradation persist. According to the Millennium Ecosystem Assessment (MA, 2005), 10–20% of drylands are degraded and over 250 million people are directly affected by desertification. The recent global agriculture assessment IAASTD (2008), as well as the 10-year strategic plan to enhance the Convention to Combat Desertification (UNCCD, 2008) stress the required strong collaboration between researchers and land users. It is generally accepted that desertification and land degradation can only be addressed through working partnerships involving scientists, land users, community members and development workers (Seely and Moser, 2004; Stringer *et al.*, 2007; Baartman *et al.*, 2007).

In recent years, much research has been done on the role and importance of collective learning processes in natural resource management (Maarleveld and Dangbégnon, 1999; Schusler *et al.*, 2003; Armitage *et al.*, 2008). In the literature, several overlapping ideas emerge as to how participatory processes can support the management of socio-ecological systems. The main idea is to enable interaction and learning between the two knowledge spheres of specialists and local communities (Stringer *et al.*, 2007; Reed *et al.*, 2007), and it is increasingly recognised that by integrating scientific and local knowledge, more sustainable solutions can be developed. What is lacking so far are concise and easy-to-use methodological frameworks, applicable to developing as well as industrialised countries, which bring together natural and human scientists, government and non-government institutions, policy makers and land users to jointly explore problems and solutions regarding SLM in a mutual learning process and to make informed decisions and test solutions. We argue that so far, desertification research has been too firmly focused on the problem (degradation) side on the one hand, and is usually dealt with by either natural or social scientists on the other hand. According to Thomas (2008), cross-disciplinary research to tackle the complexities of managing socio-ecological systems for multiple goals is still relatively rare and poses severe challenges for the way research is organized. We strongly believe that transdisciplinary, interdisciplinary and participatory research frameworks can and should facilitate SLM decision-making (Dougill *et al.*, 2006; Gonsalves *et al.*, 2005; Stringer *et al.*, 2009).

Our goal is to promote a methodology for participatory SLM appraisal and selection. It guides users through a process, starting from collective learning on desertification problems and respective solutions (Part I), to the description and evaluation of identified local solutions (Part II), and finally to jointly selecting potential solutions for implementation with the help of a decision support tool (Part III). This paper mainly presents the methodology and partly provides first experiences and lessons learnt from its current application in the DESIRE research project.

The methodology was developed within the EU-funded project DESIRE ([www.desire-project.eu](http://www.desire-project.eu)) and in collaboration with WOCAT. It is currently being applied and tested at 16 DESIRE study sites in 14 countries. DESIRE is a global research initiative to mitigate desertification and remediate degraded land. The 5-year project (2007–2012) aims to establish promising alternative land use and management strategies in 16 degradation and desertification hotspots around the world, based on close collaboration of scientists with local stakeholder groups. The World Overview of Conservation Approaches and Technologies (WOCAT; [www.wocat.org](http://www.wocat.org)) is a long-term global programme and network of SLM specialists. WOCAT has developed a methodology (WOCAT questionnaires and database) to document, evaluate, share, disseminate, and use knowledge about SLM, and has tested it over many years.

Research within the DESIRE project allowed development of a new methodology in which existing WOCAT tools have been integrated with a stakeholder learning approach and a decision support system. In the DESIRE context, the process of appraising and selecting conservation measures is used to agree on measures for test implementation at the respective study site. At least three consecutive agricultural years are necessary for testing

measures in the field. Given the project duration of 5 years, a methodology had to be developed which can be applied within a rather short time and in a variety of contexts.

The first section of this paper presents the rationale for the suggested methodology. In the second section, we explain Part I of the appraisal and selection methodology (identifying conservation measures in a stakeholder workshop), followed by first results from the study sites and a discussion. Parts II (assessment) and III (decision support) of the methodology are introduced thereafter, but cannot yet be discussed at this stage, because study sites are currently applying them and results are not yet available.

#### *Rationale of the Participatory SLM Appraisal and Selection Methodology*

A variety of already applied SLM measures can be found at the local level. However, in some cases neither land users nor researchers are aware of such practices, sometimes used traditionally or by a few innovative land users only. The suggested methodology was developed based on the premise that a wealth of experience in SLM already exists, but has not yet been well enough tapped and shared (WOCAT, 2007). The variety of SLM strategies include concrete agronomic, vegetative, structural and management measures (e.g. no- or minimum-tillage, agroforestry, vegetative strips, terraces, water harvesting structures, area enclosure) as well as an implementation approach, consisting of the ways and means of implementing technical measures on the ground, and considering changing social, economic, institutional and policy factors (WOCAT, 2007).

There are many examples of technologies that have been recommended but do not work technically (Liniger *et al.*, 2004); some are simply not adapted to the local environment or represent overkill in terms of the envisaged impact (e.g. prestige projects with inappropriate terracing or excessive dams). Unfortunately, it is still too often the case that technical experts and scientists recommend technologies to land users which are based neither on local nor other evaluated experience nor on sufficient stakeholder involvement (e.g. certain World Bank projects in China; see also Bennett, 2008). Technocratic approaches have far too often led to implementation failures or non-acceptance. At the same time, there is a move towards promoting SLM mainly through participatory approaches or even purely based on local innovations (Scooness *et al.*, 2008; Wettasinha *et al.*, 2006). But, if local innovations alone drove SLM, why do the problems still persist? We believe that such SLM implementation approaches are sometimes too centred on local knowledge alone, neglecting technical and bio-physical issues as well as the viability of projects (time, personnel, funds). We suggest an SLM appraisal and selection methodology which focuses on the practical process with stakeholders and provides a framework for an efficient, targeted engagement with clear goals and results. We argue that the key to success lies in a concerted effort, bringing together local experience and innovation with ecological and technical expertise and the consideration of socio-economic, legal and institutional framework conditions. Linking scientific, technical expert and local knowledge makes it possible to derive a range of alternative options, including current innovations and new or non-local solutions. Whether new technologies are then accepted and implemented (or modified) by land users or not depends on factors such as cost-effectiveness, severity of degradation, knowledge, enabling framework conditions (e.g. policies and subsidies), and other socio-cultural and economic aspects (de Graaff *et al.*, 2008), also requiring the integration of policy makers, local and regional authorities, civil society organisations and NGOs.

Enhancing applicability, feasibility and ownership of solutions requires the learning of all stakeholders involved. Armitage *et al.* (2008) suggest learning as an experimental and reflective, learning-by-doing process in which multiple stakeholders collaboratively test and explore management strategies. Successful mechanisms in this respect include the use of interactive techniques and combining a variety of methods from different disciplines, such as stakeholder workshops, focus groups, questionnaires and more participatory methods such as transect walks. In each of these mechanisms, collective learning is facilitated, and information flows between different stakeholders are multi-directional (Stringer *et al.*, 2006). These diverse yet interrelated approaches collectively represent participatory research and development (PR&D) – as a pool of concepts, practices, norms and attitudes that enable people to enhance their knowledge for sustainable agriculture and natural resource management (Gonsalves *et al.*, 2005). It is important to apply an approach that emphasises participation as a process of empowerment, equity, trust and learning, replacing the often-used “tool-kit” approach (Reed, 2008). What is required is a joint effort by all concerned stakeholders integrated into a process on an equal footing, where local and

external knowledge is negotiated and validated to provide greater depth of understanding and ideas for future SLM directions. The main aim of this research was to develop a framework methodology with tools to support this integration process. One challenge in the development of such a participatory approach within DESIRE was its required applicability in both developing and industrialised countries, as well as in Western democratic and Communist or transition countries. In practice, another specific challenge emerged in applying participatory and learning approaches with mainly bio-physical researchers, with little or no experience in participatory methods. The methodology therefore has to be seen in a triangle of three specific demands: (1) participatory approach and stakeholder involvement, (2) biophysical research advances, and (3) feasibility within project frame (duration, funds, set-up).

Based on the conviction that neither science nor local experimentation alone can lead to sustainable solutions to combat desertification and land degradation processes, the methodology was developed on the following premises (see Figure 1):

- *Premise for Part I:* Local land users do have strategies for SLM. Before envisaging new technical solutions to combat desertification and land degradation processes, it is worthwhile to look at what is already applied locally.
  - Approach: 3-day stakeholder workshop to bring together different stakeholder perspectives and identify existing strategies.
- *Premise for Part II:* Not all local strategies are *a priori* effective and good; therefore, a detailed assessment of local solutions needs to be done.
  - Approach: Standardised evaluation of local solutions with WOCAT questionnaires allows sharing of results with other study sites.

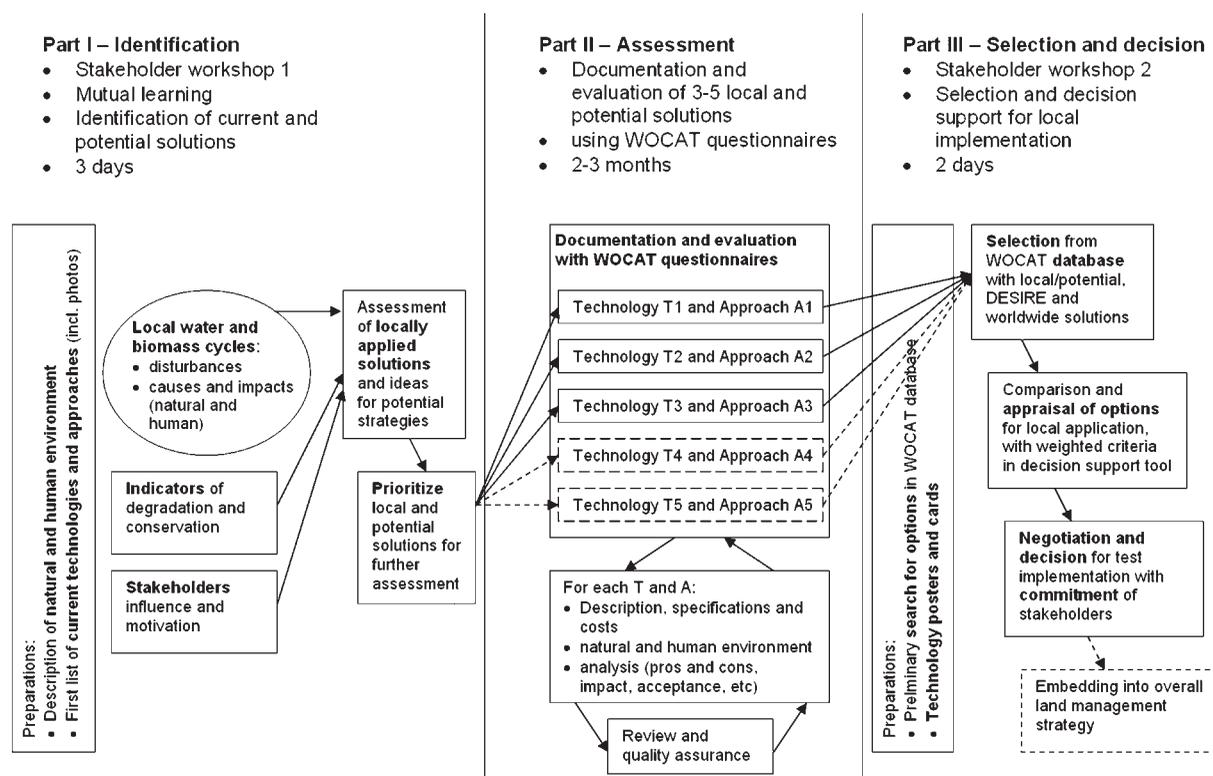


Figure 1. Overview of the methodology.

- *Premise for Part III:* Out of a basket of options, which consist of evaluated local options and additional options from the global WOCAT database, stakeholders jointly select the best.
  - Approach: 2-day stakeholder workshop to jointly select, supported by a decision-support tool for comparative analysis and selection, a strategy for implementation at the study site.

#### *APPRAISAL AND SELECTION METHODOLOGY, PART I: IDENTIFYING CONSERVATION MEASURES IN A STAKEHOLDER WORKSHOP*

##### *Stakeholder workshop approach*

To prepare and initiate the process of appraising and selecting conservation measures for test-implementation, a stakeholder workshop approach aiming at mutual learning was selected, bringing together a diverse range of actors who, traditionally, do not work together to solve problems. Active involvement of the wider stakeholder community can play a crucial role in better consideration of problems by identifying different stakeholder perspectives, providing an active learning arena for all those involved, and providing an interactive basis necessary for generating joined-up thinking (Patel *et al.*, 2007). Developing a shared understanding among involved actors is an important step towards building a common vision of what can and needs to be done to achieve more SLM. Although questions related to relative power, decision-making and social equity cannot be solved within a stakeholder workshop, it does provide a forum for discussing relevant issues (Lundy, 2006).

The initial 3-day stakeholder workshop aims to identify already applied and potential prevention and mitigation strategies in the local context. It brings together scientific and local knowledge while simultaneously supporting a co-learning process oriented towards sustainable development. Objectives of the workshop are: (1) to initiate a mutual learning process by sharing experience and knowledge and jointly reflecting on current and potential problems and solutions related to land degradation and desertification, (2) to create a common understanding of problems, potentials and opportunities by integrating external and internal perceptions, (3) to strengthen trust and collaboration among concerned stakeholders, (4) to identify existing and new strategies to prevent or mitigate land degradation and desertification, and (5) to select a set of these identified strategies for further evaluation and documentation in the next step (Part II).

The stakeholder workshop methodology (Bachmann *et al.*, 2007) was developed at CDE, University of Bern. It is based on experiences with the 'Learning for Sustainability' approach (CDE, 1998; Bachmann, 2003; Rist *et al.*, 2006), where interactive pedagogy and mutual learning between different stakeholders are at the core. The 'Learning for Sustainability' approach is characterised by: (1) *Learning in the local context:* workshops are held in a village or community. All exercises are directly related to the specific local context. (2) *Learning in a heterogeneous group:* participants are mixed in terms of stakeholder groups, age, gender, professional background, etc. Participants learn together and from each other through expressing, discussing and understanding the various perspectives on problems and opportunities at local and regional scales. By integrating local knowledge and external, more scientific or technical knowledge, a more comprehensive and shared understanding of the local context is envisaged. (3) *Multi-stakeholder and multi-level approach:* the group explores economic, ecological and socio-cultural factors and their interrelations; looks at dynamics, processes and trends in space and time; considers framework conditions and their impacts at the local level; and explores relations between different levels of decision-making (household, community, region). (4) *Interactive, process-oriented pedagogy:* methodological diversity in group and plenary exercises favours active and holistic learning. The learning process is facilitated by a workshop moderator who guides the group instead of teaching. Detailed workshop guidelines provide didactic and conceptual guidance and specific exercises.

The approach aims to integrate the complementary competences of the heterogeneous participants and their respective experiences and knowledge. Learning is fostered in a process of dialogue and joint reflection, during which everyone actively confronts his or her own reality with other people's realities. An appreciative working atmosphere, mutual trust, and open-mindedness are conducive conditions for a fruitful, active and inter-active learning process.

The workshop procedure follows a logical and consecutive sequence of specific exercises, each with its own objectives, method, procedure, and expected results (see Table I). The recapitulation and presentation of intermediate workshop results had to be planned due to the assumed constraint of external participants not being able to join for more than the last workshop day. However, most study sites did not make this distinction (for more details see below). Step by step, the exercises lead to a better understanding of the complex web of causes and effects of land degradation in the study site, create awareness of sustainable practices and solutions that are already implemented locally, help to identify additional potential solutions by integrating experience and knowledge of researchers and specialists, and result in a first brief assessment of solutions, and the selection of a few solutions for in-depth assessment in Part II of the appraisal and selection methodology. The role different stakeholder groups play in SLM and their respective levels of motivation for and influence on the implementation of SLM are discussed, and participants start to critically reflect on their

Table I. Sequence of exercises

Exercise	Objectives	Methods
Land degradation and land conservation at the study site	Establish personal relation with the topic, presentation of participants and their interest in the topic, create a relaxed working atmosphere	Photo gallery, photo language
Water and biomass cycles – the basis of agricultural production	Understand the water and biomass cycles in the local context; links between the cycles; disturbances, their causes and effects; degradation processes and dynamics (space and time); relevant framework conditions (socio-economic, legal, institutional); identify locally applied solutions to disturbances and land degradation. To raise awareness on the importance of healthy cycles as a basis for agricultural production.	Transect walk → identify local land degradation processes and solutions; visualisation → illustrate cycles with photos from study site; diagnosis of the cycles
Local indicators	Identify indicators used by local stakeholders to recognise land degradation processes and land conservation respectively.	Plenary discussion with guiding questions
Stakeholders, their motivation for and influence in implementing SLM	Identify stakeholders, their motivation and influence/power concerning the implementation of SLM; identify their relative importance for SLM; identify important stakeholders not yet included in the process; critically reflect on own role	Plenary session: stakeholder analysis
Recapitulation of intermediate workshop results and presentation to external participants	Recapitulate information and conclusions so far, prepare and brief external participants; presentation of local perspectives, get first reactions from external participants (and hints on divergences between local and external views)	Plenary and group work
Assessment of already applied and potential solutions to identified degradation problems	Identify strategies not yet applied but potentially suitable for the local context by integrating the perspective, knowledge and experience of external stakeholders; assess applied and potential strategies; jointly select strategies with highest potential (for further assessment after workshop)	Assessment (cost, benefit, potential, constraints) made in separate groups (local / external participants); prioritisation, selection
Synthesis – Outline of a strategy for SLM	Create awareness of the need for a comprehensive SLM strategy; identify and discuss important elements for a draft outline.	Plenary: Mind map, link with results from previous exercises

own role. This exercise may lead to the conclusion that relevant stakeholder groups are not yet represented in the stakeholder workshop, and that additional efforts are necessary to get them on board for the next project steps. It was a special concern of the designers of the methodology to end the workshop by taking a step back and creating awareness that SLM requires a coherent strategy embedded in a broader context. Developing a 'real SLM strategy' would of course require a much broader societal process of negotiation and concertation.

#### *Workshop guidelines and workshop moderation*

The workshop guidelines (Bachmann *et al.*, 2007) contain detailed information on the workshop set-up and the didactic approach and provide conceptual and methodological guidance for each exercise. Pre-tested and further developed in the Moroccan DESIRE study site, the guidelines are a flexible working instrument for workshop moderators. They are not a blue-print but allow and require flexible use and adaptation to each specific context.

Ideally, a team of two persons co-moderate a stakeholder workshop, one experienced with moderation techniques and participatory methods as the main moderator and a second person with specific knowledge of SLM and agricultural advice. Facilitating the mutual learning process includes ensuring timely and effective organisation of the group's work, fostering a relaxed and productive working atmosphere, and appreciative, respectful, and accepting interpersonal relations, and facilitating the dialogue between participants in such a way that they come up with their own results and conclusions.

The DESIRE project offered a specific training for workshop moderators. As researchers are an own stakeholder group in the learning process, it was requested to engage independent local moderators to avoid role confusion. Nevertheless, most study sites sent their own project personnel to be trained and therefore most workshops have been moderated by researchers instead of independent and experienced facilitators. This resulted in some weaknesses in moderation performance and independence, as moderators were wearing two different hats at the same time. At some study sites it was observed that due to this confusion or mixing roles and stakes, moderators were not neutral enough, were driving the process too strongly, or even started lecturing instead of supporting the group in developing the topic, e.g. the water and biomass cycles. The requested multi-disciplinarity of the moderator team was largely applied, and finally also appreciated, as it was felt necessary to ensure the success of the workshop. A critical point is the tendency observed at certain sites to apply the methodology somehow 'mechanically' without emphasising enough the links between the different topics and exercises. We consider this to be a result of the rather short training for moderators, and in many cases, a lack of adequate experience with participatory approaches, as initially requested.

#### *Workshop duration and participants*

The methodology was designed for a workshop duration of 3 days. If possible, all participants should participate for the 3 days, which allows more intensive interaction and exchange among local and external participants. However, during the first and second days, when the focus is on the local context and perspectives, mainly local stakeholders may attend the meeting, while on the third day, external stakeholders join the group bringing in a more regional perspective.

The workshop guidelines recommend composing the group of 6–10 local participants, i.e. land users, representatives of local authorities and community-based organisations living and working in the specific local context, and 4–6 external participants, i.e. researchers and experts from NGOs and GOs. Local stakeholders are not land users only, as is often assumed. It is also recommended to invite representatives of different categories of land users (e.g. large-scale, small-scale, land owners, tenants, pastoralists, etc.), because some conservation technologies or approaches are not appropriate for all categories (e.g. planting trees might not be allowed on leased land). Given the limited time available, the group should not be too big to facilitate active participation and interaction of all participants in the learning process, and the heterogeneity of participants should ensure that different stakeholder perceptions are represented in the process. These specifications are

Table II. Stakeholder workshops at the study sites: Duration and participants

Study site	Total days	No. of participants	Local (%)	External (%)	Land users in % of total (%)	Women in % of total (%)
Spain, Guadalentín Basin	1	24	62	38	25	25
Portugal, Maçao and Góis	2	17	65	35	18	24
Turkey, Konya Karapinar Plain	3	29	55	45	45	14
Turkey, Eskisehir Plain	3	40	27	73	28	5
Morocco, Mamora/Sehoul	3	23	37	63	29	17
Tunisia, Zeuss-Koutine	3	25	76	24	52	20
Russia, Djanybek	3	25	64	36	8	24
Russia, Novyi, Saratov	3	20	40	60	5	20
China, Loess Plateau	3	12	67	33	42	0
Botswana, Mopipi, Boteti Area	3	34	88	12	88	47
Chile, Secano Interior	2	26	54	46	54	23
Cape Verde, Ribeira Seca Watershed	3	35	64	36	60	44
<i>Average</i>		26	58%	42%	38%	22%
<i>Range</i>		12–40	27–88%	12–73%	8–88%	0–47%
Greece, Crete	1	65	Different approach used		—	—
Greece, Nestos Basin, Maggana	1	40	Different approach used		—	—
Italy, Rendina Basin	No stakeholder workshop		—	—	—	—
Mexico, Cointzio Catchment	No stakeholder workshop		—	—	—	—

clearly communicated in the workshop guidelines. On this basis, study site teams selected and invited possible workshop participants. Out of the 16 DESIRE study sites, 14 organised a stakeholder workshop; 12 used the suggested workshop methodology and 2 used other approaches (see Table II).

Many DESIRE study sites had to adapt workshop duration and procedure in various ways; some had to shorten it to 1–2 days. In Spain, for instance, where it was impossible to convince local and external stakeholders to participate for more than 1 day, participants regretted during evaluation that there was not enough time for ample discussions. Other study sites conducted 3-day workshops with local and external participants attending for the full three days, and in some cases even the full 3 days were considered to be too short (e.g. in Botswana). The number of participants at the DESIRE study sites varied from 12 to 40 persons, with an average of 26 persons. On average, 58% of the participants were local stakeholders, 38% were land users and 22% were women. But as Table 2 shows, variability between the study sites is extremely high!

Previous awareness-raising activities were planned and would have been important, but were hardly able to be conducted due to time constraints and a delay in delivering DESIRE information material developed for this purpose. Some study sites had difficulties motivating certain groups of stakeholders, e.g. in Botswana it was virtually impossible to motivate non-community people to participate, while in Spain, Morocco, and Tunisia difficulties were experienced in motivating farmers; in China it was found to be difficult to get more land users to participate due to the importance of off-farm activities; and in Turkey, participation of female farmers is difficult for cultural reasons. However, at most study sites, the local research team had previously been working with various stakeholders in the region and could rely on already established contacts, and was able to recruit a good number of land users and other participants. To our knowledge, only in Morocco were land users paid an allowance to compensate their loss of working time. Figure 2 illustrates the motivation and interest of stakeholders based on explicit remarks made in workshop reports. It shows that despite initial hesitation found at several study sites, the level of interest increased during the stakeholder workshop, and at some study sites participants explicitly wished to be further involved in and kept informed about DESIRE activities.

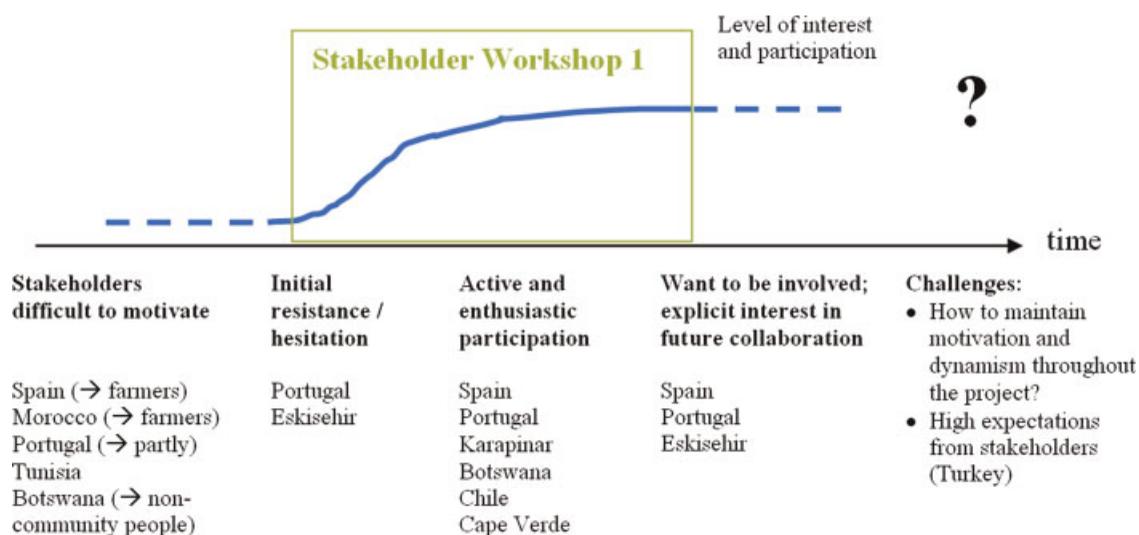


Figure 2. Level of interest before, during and after the stakeholder workshop.

### Evaluation of stakeholder workshops

Evaluation of workshop reports from 12 study sites revealed the following:

**Workshop methodology:** Except by Moroccan farmers, who did not like the time spent in discussions, the workshop methodology with its sequence of exercises was generally evaluated positively. Two study sites found it to be quite challenging for local stakeholders: in Tunisia and Botswana it was stated that synthesis steps were very challenging due to the low level of literacy. Other study sites explicitly appreciated the methodology because it fostered informal discussions, which motivated active participation (Portugal); the sequence of steps and exercises allows a systematic and transversal perspective on land degradation causes and possible solutions (Portugal); exercises are logical and well structured (Djanybek, Saratov). Two exercises were particularly appreciated: the photo gallery was highly valued by participants and provoked considerable discussion (Spain); and the water and biomass cycles were considered very good and are now also used for training university students (Djanybek, Saratov).

**Mutual learning:** One of the objectives of the stakeholder workshop, and perhaps the most important one, is to initiate a mutual learning process among different stakeholders at the study sites. This learning process is mainly based on sharing knowledge and experience and jointly reflecting on current problems and possible solutions. In fact, with the data available, it is not possible to assess what exactly has been learned by different stakeholders, and we can not prove that mutual learning actually took place, but the workshop evaluations give some hints about whether and how a process of mutual learning developed. From Spain, for example, it was explicitly reported that the mutual learning process with a multidisciplinary group was considered especially enriching. All participants were very enthusiastic and participative, they felt they had been able to contribute from their knowledge and experience and that everybody learned from others. At many study sites, participants engaged in long and lively discussions, which the moderators found difficult to stop. In Portugal, where people from two different study sites participated, causing some resistance in the beginning, they found increasing involvement in sharing experience between people from the two sites during the workshop. In Morocco, where local farmers did not see any benefit and thought there was too much time spent on not very useful discussions, external participants said they learned a lot and had a real opportunity for deep discussions with farmers, while researchers mentioned that the workshop helped them to organise their ideas and check them against farmers' and technicians' knowledge. To summarise, objectives 1 and 2, i.e. initiating a mutual learning process and creating a common understanding of problems, potentials and opportunities, were attained to varying degrees at different study sites. However, it has to be kept in mind that this stakeholder workshop is just the beginning of a longer process of interaction and co-learning.

*Workshop process and atmosphere:* Five study sites explicitly reported that they had an excellent workshop atmosphere with enthusiasm and a warm ambiance; none said that they did not. A general satisfaction with the process and interaction was expressed in Tunisia, Chile, Botswana, and Cape Verde. At both Turkish sites it was mentioned that (local) stakeholders are not used to participatory approaches and that in workshops, farmers are usually in the role of the recipients of technical know-how. Thus, these farmers especially appreciated being listened to by external participants and having the same rights of expression.

*Workshop results:* The final result of the first stakeholder workshop was generally valued highly, as in every study site it was possible (1) to establish a good basis for participatory stakeholder cooperation (objective 3), (2) to identify existing and new prevention and mitigation strategies and to select promising land conservation practices for further assessment (objectives 4 and 5), and (3) to define a preliminary pathway for a coherent SLM strategy. The brief assessment of SLM measures made by local and external stakeholders gives a clear picture of the importance and benefits of various measures. The perception of local and external stakeholders regarding limiting factors for SLM and the impact and potential of identified measures seems to be quite similar (at least that is what workshop reports led us to believe). External participants, however, more often consider training and awareness raising a constraint. Some differences are apparent regarding the assessment of economic, ecological and socio-cultural impacts, but less in estimating the overall potential of a specific measure for the local context. Surprisingly, local stakeholders often rank positive impact higher than external participants. It could not be verified whether this is due to wishful thinking or 'hard facts'.

Study site research teams got valuable inputs for the next steps in the project (see Parts II and III), as most burning issues and promising options as well as a wealth of other relevant information emerged from all exercises. This also increased the interest of participants in being involved and collaborating in future DESIRE project activities, which was one of the aims envisaged. Very valuable information was generated on socio-economic and institutional issues and (mostly) unfavourable framework conditions such as demographic problems (rural–urban migration, aging of rural population, absence of young people interested in agriculture and related loss of traditional knowledge, population pressure), the importance, and in other cases the absence of agricultural cooperatives and civil society organisations, the failure of service providers such as extension services, agricultural credit cooperatives or the land board, lack of access to credits for small farmers, lack or poor implementation of laws, lack of or improper subsidies, unfavourable land tenure rights and splitting up of land, etc.

### *Discussion*

Within the DESIRE project the stakeholder workshop is a first step in initiating a mutual learning process and motivating collaboration between study site research teams, local and external stakeholders. It will be followed by next steps, i.e. Part II (in-depth assessment of mitigation strategies) and III (participatory decision-making) of the methodology suggested here, and the implementation and monitoring phase of selected strategies (not presented and discussed in this paper). The short workshop duration of 3 days and its division into a first part with local stakeholders only and a second part with local and external stakeholders as suggested in the workshop guidelines are factors that limit the depth of the process of mutual learning but are not prohibitive. At study sites where stakeholder representation was very unbalanced, i.e. in Botswana (where only one non-community person attended), China (where two separate workshops had to be held), or Saratov (Russia) (where only one farmer attended), it can be assumed that only a very limited mutual learning process between participants occurred. A special effort needs to be made to include more relevant stakeholder groups in the next steps of the project.

Although it must be assumed that due to lack of sufficient experience, time constraints and other factors different kinds of shortcomings occur in workshop moderation, participants were generally positive about the workshop process and workshop results. This might be interpreted as an indication of the importance of and value given to the mere fact of bringing together different stakeholder groups to exchange their ideas, experiences, concerns and knowledge. However, more specific training has to be provided to moderators of future stakeholder workshops.

The use of a participatory approach and methodology proved to be especially challenging in Turkey, Russia, and China, as neither facilitators nor participants were familiar with it. Participatory methods that have evolved in Western democratic contexts are not necessarily transferable to governance structures of (former) Communist

countries, as civil society in these countries is usually weak and characterised by low level of citizen participation, of trust between people, private entrepreneurship and democratization (Stringer *et al.*, 2009). On the other hand, the political decision-making system tends to be very top-down. This was reported from China, where two main difficulties had to be faced: (1) the study site team could not directly invite relevant external stakeholders, but only through the organisation managers and (2) land users consider themselves to be executors of decisions made at higher levels and therefore give their opinions in the workshop but leave decisions to others. However, participants at the same time appreciated the workshop for having provided the opportunity to express their opinion and discuss, which is seemingly different from other meetings in China.

From Turkish study sites, it was reported that farmers, probably for the first time in their life, met experts and government officials to discuss together solutions to their problems with equal rights of expression. This might be interpreted as a slight indication for the potential that participatory learning approaches have to weaken and finally transform disadvantageous communication patterns and power relations, and engage in truly collaborative learning (Armitage *et al.*, 2008; Rist *et al.*, 2006; Schusler *et al.*, 2003).

An important outcome of the stakeholder workshops is that local (and external) people become aware of the rich and vast knowledge they can tap and the fact that they already have solutions for SLM. Reflections and insights from the workshops, combined with the will and commitment of participants to actively change things, constitute a basis for identifying and elaborating options for action (Bachmann, 2003).

Linking scientific and local knowledge makes it possible to derive a range of alternative options, including current practices and new or non-local measures, both of which require further assessment – which is the objective of Part II of the methodology.

## *PART II: ASSESSMENT OF DESERTIFICATION MITIGATION STRATEGIES USING WOCAT QUESTIONNAIRES*

### *The WOCAT methodology*

The second part of the suggested methodology (Schwilch *et al.*, 2007) entails evaluating and documenting the identified existing and potential prevention and mitigation strategies (from Part I) in the 2–3 months following the workshop. Comprehensive questionnaires and a database system have been developed within the WOCAT programme ([www.wocat.org](http://www.wocat.org); Liniger and Schwilch, 2002; WOCAT, 2007).

The WOCAT questionnaires allow teams of researchers and specialists, to document and evaluate together with land users all relevant aspects of technical measures, as well as implementation approaches. Going through this evaluation process greatly enhances understanding of the reasons behind successful local experience – whether introduced by projects, or found in traditional systems – and how to share it among various sites. WOCAT methodology and databases do not offer ‘plug-and-play’ SLM solutions, where soil and water conservation technologies and approaches can be taken from one place and simply copied to another environment. They provide a proven methodology and a tool to document and evaluate what one is doing in terms of SLM strategies as well as a means to compare one’s own experience with those of others. The use of the WOCAT tools stimulates evaluation (self-evaluation as well as learning from comparing experiences) within SLM initiatives where, all too often, there is not only insufficient monitoring but also a lack of critical analysis (Critchley and Liniger, 2007).

The objectives of Part II are: (1) to document and evaluate each identified locally applied technology and approach in a structured and standardized way, (2) to guarantee a certain level of data quality through a review and quality assurance process, and (3) to enter this information into the WOCAT database in order to share it with other sites as well as globally. Strategies to be documented consist of technical measures as well as implementation approaches.

Technologies are understood as agronomic (e.g. intercropping, contour cultivation, mulching), vegetative (e.g. tree planting, hedge barriers, grass strips), structural (e.g. graded banks or bunds, level bench terrace, dams) and management measures (e.g. land use change, area closure, rotational grazing) that control land degradation and

enhance productivity in the field. The above-mentioned measures are often combined and thus enhance each other. The questionnaire on technologies addresses the specifications of the technology (purpose, classification, design, and costs) and the natural and human environment where it is used. It also includes an analysis of the benefits, advantages and disadvantages, economic impacts, acceptance, and adoption of the technology.

SLM approaches are ways and means of support that help to introduce, implement, adapt, and apply SLM technologies on the ground. An SLM approach consists of all participants (policy-makers, administrators, experts, technicians, land users, i.e. actors at all levels), inputs and means (financial, material, legislative, etc.), and know-how (technical, scientific, practical). Questions focus on objectives, operation, participation by land users, financing, and direct and indirect subsidies. Analysis of the described approach involves monitoring and evaluation methods as well as an impact analysis. A questionnaire on technology and a corresponding questionnaire on approach together describe a case study/strategy within a selected area.

Analysis of the type of technical measures identified in Part I at the DESIRE study sites results in 19 agronomic, 10 vegetative, 23 structural and 25 management measures, whereas in 17 cases two types of measures are combined. The variety of identified measures also reflects the diversity of degradation and desertification problems prevalent at the study sites. Some conservation technologies were mentioned at several study sites, such as drip irrigation, which was mentioned in both Russian, both Turkish and the Crete Greece study sites, but was applied so far only in Konya Karapinar (Turkey) and Crete (Greece). Other measures can also be grouped into similar categories, as presented in Table III. The table serves as an overview of identified measures.

The DESIRE study sites are currently (January 2009) working on the documentation and evaluation of identified measures. It is therefore not yet possible to present results from Part II and Part III in this paper.

#### *Assessment process*

The questionnaires mainly address specialists in the field of SWC and SLM; it is they who do the documentation and evaluation work. In DESIRE, documentation is done by the (team of) SLM specialists who were already involved in the moderation of the stakeholder workshop (see Part I above). In order to consolidate the information it is important to involve and confront land users with project/ministry/advisory people and with researchers/scientists, as this is crucial especially for the impact assessment. Experience shows that the greater the interaction between providers of information and users, the better the result. Additional sources of information such as project reports, case studies, photos and maps which help to answer the questionnaires are also considered. Knowledgeable reviewers counter-check the data and assess data comprehensiveness, readability and quality. This ensures that documented strategies are understood by a global audience, i.e. people who do not have background information about the local situation. Often, issues self-evident for local SLM specialists are not mentioned or explained, which demolishes the comprehensiveness of a SLM strategy. Therefore, guidance for reviewers is provided, giving hints on most common problems and pitfalls (see also Liniger *et al.*, 2004).

The WOCAT questionnaires were originally designed to document and evaluate actually applied and tested practices. Within DESIRE, potential measures are also included in order to draw on and follow up on ideas expressed by stakeholders in Part I. These are either described in a less detailed manner, for which a standard format was made available, or documented (hypothetically) with the help of the WOCAT questionnaires. From a total of 60 priority measures agreed upon in the stakeholder workshops at 15 DESIRE study sites, 39 are already applied practices, whereas 21 are potential measures. It is apparent that at some study sites, all promising measures have already been applied and in others all are potential only. Among the first group (all applied) are the study sites in Portugal, Nestos Basin, Crete, Morocco, Tunisia, and China, and among the second group (all potential) Djanybek and Chile.

To summarize, the steps to be followed during Part II are: (1) become familiar with the questionnaires on technologies and approaches, and plan the documentation and evaluation process, (2) refine the technologies and approaches to be assessed, (3) identify resource persons and relevant documents, (4) fill in the questionnaires: consult documents and resource persons, (5) enter the data into the database, (6) review: identify possible reviewers and share data with them, (7) quality assurance: revise data by incorporating reviewers' comments and

Table III. Applied and potential SLM measures identified in the DESIRE study sites

Category/group	Applied and potential measures identified at DESIRE study sites
Conservation agriculture	<ul style="list-style-type: none"> <li>• Minimum and/or contour tillage</li> <li>• No tillage</li> <li>• No till land management practice</li> </ul>
Ploughing management	<ul style="list-style-type: none"> <li>• Nets spread on the soil surface in combination with no tillage</li> <li>• Contour ploughing</li> <li>• Deep ploughing (soil internal drainage improvement)</li> </ul>
Intercropping	<ul style="list-style-type: none"> <li>• Subsoiling</li> <li>• Interplanting</li> </ul>
Rotational system	<ul style="list-style-type: none"> <li>• Ley farming system</li> <li>• Crop rotation</li> <li>• Rotation of annual cultivations</li> </ul>
Terraces	<ul style="list-style-type: none"> <li>• Rotational fodder cultivation</li> <li>• Terraces and vegetation strips</li> <li>• Building terraced field</li> <li>• Land terracing</li> </ul>
Eco-agriculture	<ul style="list-style-type: none"> <li>• Shift to ecological agriculture/high quality products</li> <li>• Integration of agricultural and ecological systems</li> </ul>
Soil/nutrient management	<ul style="list-style-type: none"> <li>• Green manure</li> <li>• Liquid manure → biogas → fertilizer</li> <li>• Gypsum addition</li> <li>• Land phyto reclamation (sudan grass)</li> <li>• Licorice (<i>Glycyrrhiza</i>) cultivation</li> </ul>
Vegetative strips/cover	<ul style="list-style-type: none"> <li>• Strip cropping</li> <li>• Green cover in vineyard</li> </ul>
Agroforestry	<ul style="list-style-type: none"> <li>• Fruit tree plantation along the contour separated by strips of crops</li> </ul>
Forest protection	<ul style="list-style-type: none"> <li>• Implementation of a Forest Intervention Area (ZIF)</li> <li>• Prescribed burning</li> <li>• Primary tracks</li> </ul>
Afforestation	<ul style="list-style-type: none"> <li>• Reforestation</li> <li>• Assisted cork oak plantation</li> <li>• Tree planting (2×)</li> </ul>
Livestock management	<ul style="list-style-type: none"> <li>• Improvement of animal production</li> <li>• Game ranching</li> </ul>
Pasture management	<ul style="list-style-type: none"> <li>• Controlled grazing in deciduous woods, alternative to grazing rangeland and pasture</li> <li>• Grazing control</li> <li>• Range land resting <i>tegdeel</i></li> <li>• Closure against grazing</li> <li>• Fodder crops production</li> </ul>
Drainage and irrigation technologies	<ul style="list-style-type: none"> <li>• Drainage system maintenance (groundwater level control)</li> <li>• Drainage</li> <li>• Irrigation technologies</li> <li>• Freshwater transport</li> </ul>
Drip irrigation	<ul style="list-style-type: none"> <li>• Drip irrigation (5×)</li> </ul>
Rainwater harvesting	<ul style="list-style-type: none"> <li>• <i>Jessour and tabias</i></li> <li>• Rainwater harvesting</li> <li>• Cisterns</li> <li>• Water-proofing</li> </ul>
Flood management	<ul style="list-style-type: none"> <li>• Spillway <i>Massraf Jebed</i></li> <li>• Recharge units and flood spreading</li> </ul>
Dams	<ul style="list-style-type: none"> <li>• Dam construction (2×)</li> </ul>
Energy management	<ul style="list-style-type: none"> <li>• Biogas use as energy source</li> </ul>
More general and socio-economic strategies	<ul style="list-style-type: none"> <li>• Slopes and riverbed protection</li> <li>• Training and sensitization</li> <li>• Institutional and legal capacity strengthening</li> </ul>

improvements, and (8) deliver an English-language version to WOCAT for inclusion into the global WOCAT database.

The WOCAT questionnaires have recently been thoroughly revised, shortened and adapted to challenging new issues such as ecosystem services, adaptation to climate change, and poverty alleviation. The unique, widely accepted and standardised WOCAT methods are herewith enhanced and embedded in an overall methodology. This allows exchange of valuable knowledge among all stakeholders and among the study sites as well as worldwide, and is also the foundation for the selection and negotiation process in Part III.

### *PART III: PARTICIPATORY DECISION MAKING FOR IMPLEMENTATION OF MITIGATION STRATEGIES Embedded selection and decision support tool*

This third part comprises a second stakeholder workshop where promising SLM strategies are selected for implementation at the study site. The available options are based on the locally applied and evaluated strategies as well as on worldwide documented experiences, all of them included in the global best practices database of WOCAT. A comparative selection and decision support tool, which was specifically adapted to the needs of DESIRE, is applied during a second stakeholder workshop. This allows better appreciation and negotiation of remediation strategies and support of the negotiation process concerning the best option(s) for a given human and natural environment. Again facilitated by a workshop moderator, participants conduct a multi-criteria evaluation to rank existing and potential remediation strategies for field trials. This involves stakeholders identifying and weighing relevant criteria (e.g. technical requirements, costs and benefits of implementation, social acceptability, etc.), taking into account the technical, bio-physical, socio-cultural, economic and institutional dimensions. The core of the methodology applied is based on principles of Multi-Criteria Analysis (MCA), a well-known and systematic way of making choices according to objectives and available options. It does not rely on monetary values and can use both qualitative and quantitative assessments (Tenge, 2005).

The methodology applied in this second workshop consists of three main elements. First, the WOCAT database to choose the options or strategies for land conservation. Second, a Decision Support System (DSS) software supporting the single steps in the evaluation and decision-making process. Third, a participatory approach to guide and lead the workshop participants through the evaluation and decision-making process.

Objectives of this second stakeholder workshop are: (1) to select possible implementation options from a vast basket of options, (2) to compare, score and rank these options, (3) to negotiate the best option for implementation, and (4) to decide upon 1–2 strategies for implementation. Participants are the same as in stakeholder workshop 1, and the moderators and SLM specialists again have practical guidelines at hand to plan and conduct the process. The workshop guidelines (Schwilch *et al.*, 2008) consist of didactic guidelines, which formulate learning objectives, and describe a step-by-step procedure for leading the participants through the decision-making process; thematic sheets providing theoretical and conceptual orientation; and instruction sheets on the use of the software. The moderators have to be very careful not to manipulate where they do have a great deal of influence, as for instance during the preparatory work done before the workshop. They need to prepare the first selection step in advance, as this is too demanding (e.g. regarding translation) and time-consuming to be done during the workshop. This entails going through a series of key questions and using a predefined ‘search-by-criteria’ form to find the most suitable technologies and approaches from the WOCAT database. Key questions allow narrowing down the selection with regard to climate, land use and other crucial issues. After coming up with a manageable number of solutions (i.e. about 5–10), the specialists have to prepare posters and cards illustrating these solutions, based on a predefined format and an automatic retrieval of the data, but possibly with a necessary translation and adaptations to the local context (e.g. what would this measure cost in their situation). This preparatory step is a delicate aspect of the methodology, as the moderators/SLM specialists are asked to anticipate possible outcomes of stakeholder discussions in step 1, to the best of their knowledge. It is anticipated that this is possible as the discussion in step 1 is a follow-up of the work done and discussions held in the first stakeholder workshop, which provide a sound basis.

However, the moderators/SLM specialists should carefully explain the purpose and use of the WOCAT database as well as the (preparatory) search process to the participants for transparency enhancement and reduction of mistrust. They should also be open-minded and flexible, as it could happen that the stakeholders focus on something other than the anticipated objective. In this case it will be necessary to make a new search in the database and print the resulting options during the workshop itself.

The moderation issues mentioned here are described in detail in the workshop guidelines, to make the moderators aware of their role and responsibility. Specific training was provided to the DESIRE study sites in conducting Part III of the methodology. The same restrictions apply here as for the first training, i.e. the persons sent to the training were again not experienced and independent moderators, but rather researchers from the study site teams.

### *Second stakeholder workshop*

Basically, the 2-day workshop follows up on what was discussed in workshop 1, including recently acquired knowledge from the documentation and evaluation process (Part II). The workshop steps, their objectives, and methods are shown in Table IV.

Table IV. Steps during second stakeholder workshop

Step	Objectives	Methods
Review and adjustment of objective(s)	Confirming or reformulating the main objectives of the SLM strategy as initiated in workshop 1, select one objective to focus search of options.	Plenary: recall workshop 1 results; consensus building.
Identification of options	Identifying a range of options (technologies) from the WOCAT global database, fitting the selected objective. Agreeing on 4–7 options for further evaluation in the following steps.	Plenary: posters presenting pre-selected options in detail. Plenary discussion to confirm and reduce selection, or to search for more options in the database.
Identification of relevant evaluation criteria	Agreeing on 9–12 criteria that reflect the most important qualities strategy options must have (e.g. costs, social acceptability, ecological effectiveness, etc), to be relevant to the local context.	Group work: brainstorming in stakeholder groups; Plenary discussion: consolidation and finding of common understanding.
Scoring of options	Scoring all options against all criteria (i.e. to assess to which extent the various options fulfil the selected criteria). Make variations transparent in the assessment made by different stakeholder groups.	Group work: scoring all options against all criteria.
Creating a hierarchy and ranking criteria	Assign relative weight by organising criteria in a hierarchical order (importance related to objective) within the three groups 'ecological, 'economic' and 'socio-cultural'.	Plenary: visual ranking.
Analysis and interpretation	Visualizing the relative merits of different options and interpretation of results	Plenary: explaining and discussing analysis graphs (made by DSS software, see below).
Prioritising of options – negotiation and decision making	Finding final agreement on which option should be selected for test-implementation, ideally scoring high socially, economically and environmentally.	Plenary: negotiation of options.
Embedding into the overall strategy and seeking commitment	Refinement of the draft of an SLM strategy to fit in the option selected and to consider framework conditions. Seeking commitment from all concerned stakeholders regarding their support of the implementation process.	Group work and plenary: identifying commitment within stakeholder groups and plenary discussion.

To be feasible, possible options must fit into the specific bio-physical, economic and socio-cultural context of the respective study site. An option can only be considered sustainable if its evaluation is (more or less) positive with respect to all three dimensions of sustainability: economic, ecological, and socio-cultural. That is, it has to pay off for the farmers implementing it, has to have positive impacts on the land (including soil, water, vegetation, fauna), and has to be acceptable to local actors by fitting into the socio-cultural context and practices. The evaluation therefore requires selecting useful criteria in these three dimensions. They should also clearly vary between the options and be (easily) assessable. To make sure that everybody assesses in the same way, it is crucial to have common understanding among all participants about the meaning of each criterion. Scoring is done in a practical exercise using the previously prepared cards and a 'visualisation ladder' on which stakeholder groups can score all options against one criterion at a time on a scale of seven levels (from very bad to very good). The score 0 is used to indicate a killer criterion, meaning that the option assessed is not viable because of that criterion (e.g. costs above a certain threshold or material required which is not available). The whole process is iterative, i.e. criteria, options, scores and rankings may be revised several times, if necessary.

#### *Use of decision support software*

Decision support tools were developed for various purposes (Saaty, 1980; Lawrence *et al.*, 2000; Oxley *et al.*, 2004; Barac *et al.*, 2004; Carlon *et al.*, 2004; ADVISOR, 2004; DESURVEY, 2005; Janssen and van Herwijnen, 2006, various articles in the *Journal on Decision Support Systems*, etc.) but none seems suitable for finding, assessing and negotiating mitigation options in a simple manner jointly with stakeholders. Many DSS are well suited to the particular problem for which they were originally designed, but generally have a fixed structure or a defined set of data processing and model connection paths, and therefore are rarely suitable to meet the needs of a new application (Argent *et al.*, 2009). Information technology can help a great deal in achieving SLM by providing well-designed and useful tools for decision makers (Kersten *et al.*, 2002). But what was mainly looked for here was an open and flexible tool designed to assist the user in the assessment of options rather than give a solution, being therefore more a kind of discussion support system. The open-source software 'Facilitator' (Heilman *et al.*, 2002) proved to be most suitable for the envisaged purpose, mainly because it is simple and adaptable to almost any situation requiring negotiation and decision by a group of stakeholders. The applied process and support software for engaging stakeholders can resolve issues of natural resource management when there are multiple and possibly conflicting objectives and criteria to consider (Lawrence *et al.*, 2000).

The Facilitator software was adapted to fit our purpose and support the above-described process and be integrated into step III of the methodology. Many steps in the procedure are made on paper and without computer, depending also on the (computer) literacy level of the participants. During the workshop, the computer is used mostly in the background and not directly in work with the stakeholders. Ideally, an assistant or the second moderator feeds the data from each step (results from work done in the different steps) into the Facilitator software. Only calculations for analysis of the assessment really need to be done by computer. The software is used for the mere reason of dealing with the impossibility of handling and processing all the information generated in the assessment process, and this should also be made clear to the participants.

## CONCLUSION AND OUTLOOK

Developing this methodology consisted mainly of linking a number of existing tools and methods and integrating them into a coherent and comprehensive evaluation and decision-making process. In principle, it can be applied with the aim of finding strategies for SLM in every local context, whether affected by or highly prone to desertification or any other form of land degradation. However, applicability is limited in socio-political contexts with very strong top-down decision-making and weak or non-existent civil society bodies. The intended process starts with initial co-learning among different stakeholders about degradation and conservation, includes appraisal of existing (local and external) field experience, and ends with the agreed selection of a solution for field trial. In DESIRE, field trials are done together with land users who participated in the workshops and showed willingness

and interest in implementation and monitoring. Other relevant stakeholders are involved as much as possible during this subsequent phase.

We believe that the methodology presented here has a great potential to incorporate relevant stakeholders and local and external knowledge throughout the whole process of identifying, testing and validating strategies for SLM. At the same time it is flexible enough to be adapted to specific local or regional conditions. Regularly applied in the sense of a regular reflection and assessment process among different stakeholders, it allows for reconsidering trends and new developments, including recent innovations, and developing strategies to adapt to changing environmental and socio-economic conditions for SLM, such as climate change, or world market turbulence.

DESIRE offers an excellent opportunity to apply this methodology in 16 study sites in desertification-prone areas around the world, providing a chance to test its functionality in a broad range of contexts. Preliminary results presented here show that besides necessary local adaptations to the methodology, various significant alterations have been made by study site teams affecting the quality of the intended mutual learning process. Therefore, in future more specific training and continuous support for the users will be necessary. Despite this shortcoming, stakeholder workshop 1 offered an opportunity to involve a broader range of stakeholders, which itself is already a big achievement for a number of study sites. Analysing the implementation of the first part of the methodology has revealed some strengths and weaknesses, as discussed in this paper, but only after analysis of the second and third parts and after also knowing the outcome of the SLM implementation and monitoring in the field can more be said regarding recommendations and overall applicability.

Each of the three parts offers pronounced challenges to those applying the methodology. First, there is a methodological challenge in the application of such a multi-stakeholder and multi-level approach. Working with a variety of stakeholders involves facing and overcoming certain initial resistance or reluctance, guiding a heterogeneous group in a common development process, and moderating flexibly to accommodate local peculiarities. NRM decision-making demands reflexivity and skilful facilitation; good facilitation of such a process is therefore very critical (Groot, 2002; Critchley *et al.*, 2006). This requires capacity development of moderators and facilitators. The second challenge lies in comprehensive understanding of degradation and conservation aspects, which is a prerequisite for the successful conduct of the methodology. SLM is a complex issue, which calls for collaboration at different levels of decision-making and action, and for integrating local and external knowledge as well as natural and human sciences to develop adequate strategies. As the selection of options is based on the wealth of information available within the region and from outside, it demands information to be fed into the common database, as more available knowledge provides a broader variety for selection.

In addition to DESIRE, the full methodology will also be used by various WOCAT initiatives in different countries. This will allow further evaluation of its implementation by SLM practitioners such as agricultural advisors and development professionals rather than researchers. These experiences will show its worldwide suitability and usefulness – and possible limitations. Further testing and application in any desertification-prone area around the world is intended in order to improve the methodology. Certainly, the complex and multi-stage nature of the approach requires refinement and further critical reflection.

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