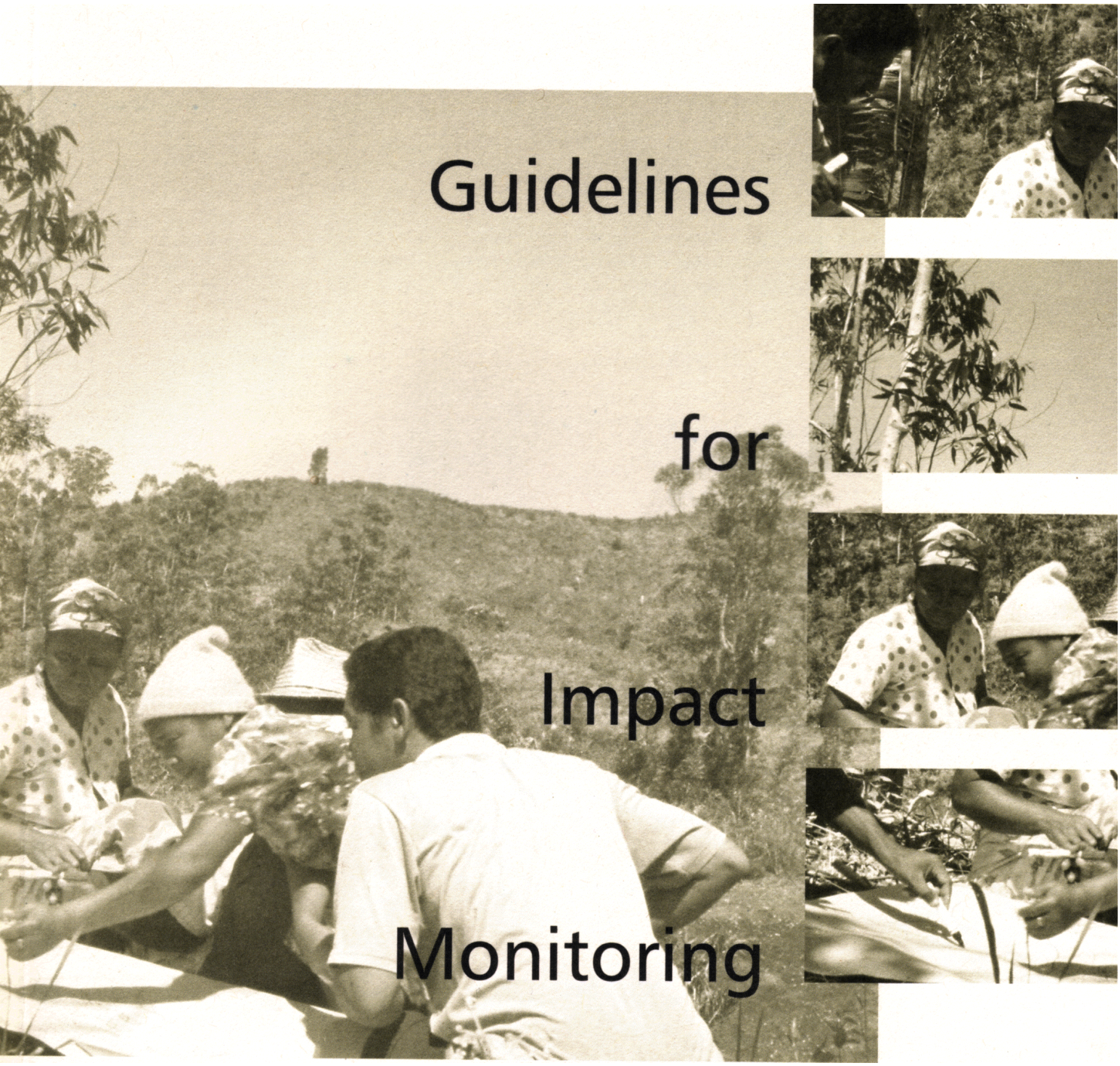
Main menu

Sustainable Land Management



Workbook

Working Documents for Public Discussion

Sustainable Land Management

Guidelines for
Impact Monitoring

WORKBOOK

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AB-DLO, The Netherlands
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CIDA, Canada
COSECHA, Honduras
DIFID, United Kingdom
GTZ, Germany
Helvetas, Switzerland
IBSRAM, Thailand
IDRC, Canada
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About These Guidelines

These SLM-IM Guidelines have been developed in inter-institutional collaboration with many development agencies. The contents have been compiled from published and non-published documents and from discussions with colleagues from numerous organisations experienced in SLM.

There are already a number of useful guidelines concerned with impact monitoring in general. Most documents deal with general issues and leave many open questions to the user who is looking for more specific information. Relating impact monitoring guidelines to an important topic (e.g. SLM) allows more specific information and provides additional and more practical guidance. SLM as a trans-sectoral theme, which includes ecological, economic, social and political aspects from local to national level, reflects an important part of sustainable development and is not too narrow in focus. Using SLM as a point of departure, the IM procedure can be adapted more easily to other important development issues, such as education, health, etc.

The SLM-IM Guidelines presented here have been created as a set of working documents. The four modules can either be used as a set to conduct a complete SLM-IM procedure, or they can be used selectively. To improve the user-friendliness and quality of the Guidelines, a test phase during which the Guidelines will be applied, discussed and improved in development programmes and projects will be carried out in the coming months:

- The inventory of cost-effective and participatory monitoring methods presented in this edition is by no means complete. It encourages users to develop and refine their own methodologies and to add them to the existing set.
- Beyond this, any agency may tailor the SLM-IM procedure presented in these Guidelines to its own monitoring requirements.

The authors hope that these Guidelines will continue to be developed in an interactive process. All users within development organisations and projects are invited to report their experiences and suggestions to the authors. This will allow us to periodically update and supplement the inventory.

Acknowledgements

These Guidelines are the result of collaboration involving international development agencies, universities and individuals from several continents. From the beginning, all parties shared the need for practical tools and cost-effective monitoring in the field of sustainable land management. This made it possible to bring a critical mass of professionals together to make optimal use of the tremendous work that had already been done, and thus to avoid reinventing the wheel. The authors wish to express their deep gratitude to all who contributed, be it through their participation in two workshops, their assistance in identifying relevant documents, their part in writing up and editing the Guidelines, or their willingness to donate some of their time. Funding was generously provided by the Swiss Agency for Development and Co-operation, the GTZ (German Society for Technical Co-operation), and the World Bank.

Foreword

A key activity in promoting sustainable development, as identified at the Earth Summit+5 conference in 1997, is a revitalised rural investment strategy. This would include intensified production to meet growing demands while concurrently ensuring conservation of natural resources and promotion of sustainable land management. Important components in this strategy include development of indicators and procedures for monitoring impacts of projects, programmes, and policies on the productivity and quality of land resources. These are required to guide and advise us as we struggle to make the right choices. Although is not possible to assess true sustainability at present, it is certain that with the correct technologies supported by environmentally friendly policies and programmes, we can evolve towards land use systems that are more sustainable than what we have today.

Land is the basis for over 95% of all agricultural production and the sustainable use of land resources is a precondition for sustainable rural development. Therefore, promoting land management practices which ensure productivity gains while enhancing the quality of the land resource is a primary objective of agricultural and rural development projects. But often this objective is more implied than explicit because of the paucity of indictors with which to assess land quality, and the lack of cost-effective monitoring methods for application in projects.

In the past, projects were evaluated by their performance using the mainly quantitative indicators in the project planning document. This, however, did not give an evaluation of the long-term impacts of the project, and it was not unusual that even apparently successful projects proved to be unsustainable when evaluated several years after the project's end. Today, it is increasingly required that projects be assessed by their impact, i.e. the sustainability of their results, but the difficulty is still how this can be measured. These guidelines are intended to address this problem, and to promote more direct identification of land management objectives in rural development projects.

We are particularly proud that these guidelines are the fruit of a truly joint effort of our agencies, with additional contributions from many more institutions and experts. We are confident that this will ensure that a wide range of practitioners makes use of the guidelines in their work. We are committed to continuing our collaboration in field testing of the tools and instruments described, and to making eventual revisions. Special thanks go to the main persons involved in the co-ordination and editing of the guidelines, namely Karl Herweg of CDE (Centre for Development and Environment), Kurt Steiner of GTZ, and Julian Dumanski of the World Bank.

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Sustainable Land Management

Guidelines for
Impact Monitoring

PATHFINDER MODULE

Guidance for users

Pathfinder Module Guidance for users
Sustainable Land Management Module The importance of SLM
SLM Impact Monitoring Module A seven-step procedure for SLM-IM
Toolkit Module A selection of practical tools and cost-effective methods

PATHFINDER MODULE

Contents


GPS

Sustainable Land Management Guidelines for Impact Monitoring (SLM-IM)

Executive Summary

Why sustainable land management?

On a global scale, land resources are becoming increasingly scarce, and the quality of resources such as soil, water, plants and animals is decreasing, mostly as a result of poor management. Only a few countries currently have land resources available for agricultural expansion, and in most cases the lands cultivated today are the same lands that must be protected for the future. This is a new experience for the global community, and there are still difficulties in determining the most suitable approach to achieve this goal. In the past, it was possible to open new lands of good quality to cultivation. But this often resulted in exploitation. Today, however, we must move increasingly towards better management, conservation and stewardship.

In most developing countries, the majority of people are still engaged in agriculture, livestock production, forestry and fishery. They are thus directly dependent on land resources for their livelihood. These people are often the poorest and most underprivileged strata of society. Sustainable management of land resources represents one of the few opportunities they have to improve their position. Sustainable land management (SLM) enables smallholders to gradually improve their production capacity and begin generating additional income. In turn, this stimulates local economies and produces a compounding effect which progressively brings the cycle of rural poverty and resource degradation under control. Consequently, the question for national governments and the donor community is not whether we should be promoting sustainable land management, but why haven't we been doing it up to now, or rather, how should we proceed from now on? SLM has therefore become a key element of AGENDA 21 (Chapter 14), and plays a central role in sustainable development and poverty alleviation.

Why SLM impact monitoring?

Most activities in development projects or programmes influence the productive potential of land in one way or another. Agricultural projects, for example, are directly concerned with land management. But the establishment of infrastructure, irrigation dams, rural services, refugee camps, etc. also has an impact on land resources. Land management activities can be both beneficial and harmful. Information about the status quo of the environment and about land management trends is urgently needed to decide which activities or measures will lead to sustainability. Is land management moving towards or away from sustainability? Since the impact of a project or the general trend is not always immediately visible but often becomes apparent after a project phases out, only long-term monitoring will provide insight. SLM impact monitoring (SLM-IM) is a means that provides the required information necessary for appropriate decision-making, from the project level up to the policy-making level.

The need for adequate monitoring tools

Professionals often lack comprehensive and, at the same time, flexible monitoring instruments to assess the impact of development-oriented activities on the land. Therefore, SLM-IM frequently had to be limited to a partial analysis within the overall evaluation of project performance. In order to fully acknowledge the importance of SLM for sustainable development, practical tools are needed that permit rapid, cost-effective identification of project impacts on land management. In response, an inter-institutional working group has developed the Guidelines presented here, which assist in establishing a systematic monitoring procedure that is both practical and requires limited inputs of human and financial resources. Their main aim is to make impact monitoring processes easier, by providing introductory literature, methodology and tools. Further objectives include low-cost and relatively low-tech monitoring methods, suitable for in-project and post-project monitoring. Special emphasis is given to easy accessibility of information, transparent user-guidance and systematic presentation.

Knowledge base

The Guidelines are based on current literature, project documents, and the experience of many authors and contributing development agencies. Although the Guidelines propose a basic methodology, their design is flexible and can be implemented in many stages of project execution. Since project realities vary considerably, methodologies are adaptable to local conditions. Where highly accurate data are required, specialists should be consulted, since practical indicators and cost-effective methods have their limitations in accuracy and scope.

Principal users

The Guidelines assist programme and project co-ordinators and managers (1) in initiating a monitoring procedure, selecting indicators and methods, assessing the results, and organising user-oriented outputs, presentation, dissemination and storage of the information gathered in the process of SLM-IM. The Guidelines provide project specialists (2) with tools to carry out impact monitoring.

Benefits

Investment in SLM-IM produces added value and different benefits for a project, including:

- identification of unsustainable project activities
- decision-making about activities that promote sustainability
- incremental improvement of project design and organisation
- better integration of local knowledge and capabilities
- improved goal-orientation of land management projects
- systematic learning from experience
- more efficient use of funding

Operational focus of the Guidelines

Sustainable land management in developing countries

There is growing concern among development organisations about land resource degradation related to inappropriate land management. While industrialised countries are more concerned with pollution and the sinks in the ecosystem (air, water and soil pollution, CO_2, etc.), developing countries face direct problems with the maintenance of sources of the system (soil productivity, biodiversity, etc.).

Local context

There are no global procedures or standard sets of indicators to monitor the impact of a project on SLM. Due to the specific setting of each project, SLM-IM has to be adapted to each individual situation. The Guidelines have therefore been kept open and flexible to allow adaptation to local conditions.

Participatory approach

SLM-IM is a participatory process involving project staff and various stakeholder groups. The Guidelines suggest efficient feedback mechanisms that keep local stakeholders interested in and informed about the monitoring process.

Sustainability orientation

The Guidelines focus on the integration of people's needs and the protection of natural resources in one conceptual approach to sustainability. The emphasis is on monitoring trends that indicate whether land management is moving towards or away from sustainability, rather than on monitoring against international standards and threshold values of tolerable soil or water quality.

Low-cost, low-input approaches

The Guidelines emphasise cost-efficient indicators and monitoring methods. Thus, SLM-IM is likely to be participatory and continued in a post-project phase.

1 How to Use the Guidelines

Principal users of the Guidelines

The Guidelines address a broad range of principal users:

(1) Programme co-ordinators and project managers will find assistance in initiating the monitoring procedure, assessing results and organising presentation, dissemination and storage of information.
(2) Agronomists, geographers, socio-economists or other persons conducting the monitoring will find advice about which monitoring methods to select.

As users' backgrounds may differ and not all users will necessarily have a background in land management, the Guidelines are presented in two documents containing four different modules.

Guideline documents and modules

- The **WORKBOOK** contains a brief executive summary and three modules:
  - The **"Pathfinder" Module** serves both groups of users and helps in locating relevant modules, chapters, steps and tools.
  - The **"Sustainable Land Management" Module** provides basic information on the importance of the SLM concept. It guides users in identifying possible connections between their specific programme and SLM. It is most relevant for user group (1) but also provides a background for user group (2)
  - The **"SLM Impact Monitoring" Module** briefly describes the seven steps of the monitoring procedure. It is designed to help user group (1) organise and gain an overview of the SLM-IM procedure, and provides background information for user group (2) in applying methods and tools from the Toolkit Module. SLM-IM consists of the following steps:
    - Step 1: Identification of stakeholders
    - Step 2: Identification of core issues
    - Step 3: Formulation of impact hypotheses
    - Step 4: Identification and selection of indicator sets
    - Step 5: Selection and development of SLM-IM methods
    - Step 6: Data analysis and assessment of SLM
    - Step 7: Information management
- The **"TOOLKIT"** contains methodological options corresponding to selected steps of the SLM-IM procedure. The Toolkit is most relevant to user group (2). It can be selectively used, upgraded, and supplemented by users' own methods and tools, or tailored to suit specific needs. It thus encourages users to develop and document their own methodological experience. The Toolkit consists of the following sections:
  - A: Core Issues / Impact Hypotheses
  - B: Selection of Indicator Sets
  - C: Selected Methods for SLM Impact Monitoring
  - D: Assessment of SLM

The modular design of the Guidelines was chosen to facilitate both their use and modification after a field-testing phase. Accordingly, important factors are appropriate guidance for users and ease of navigation throughout the entire document.

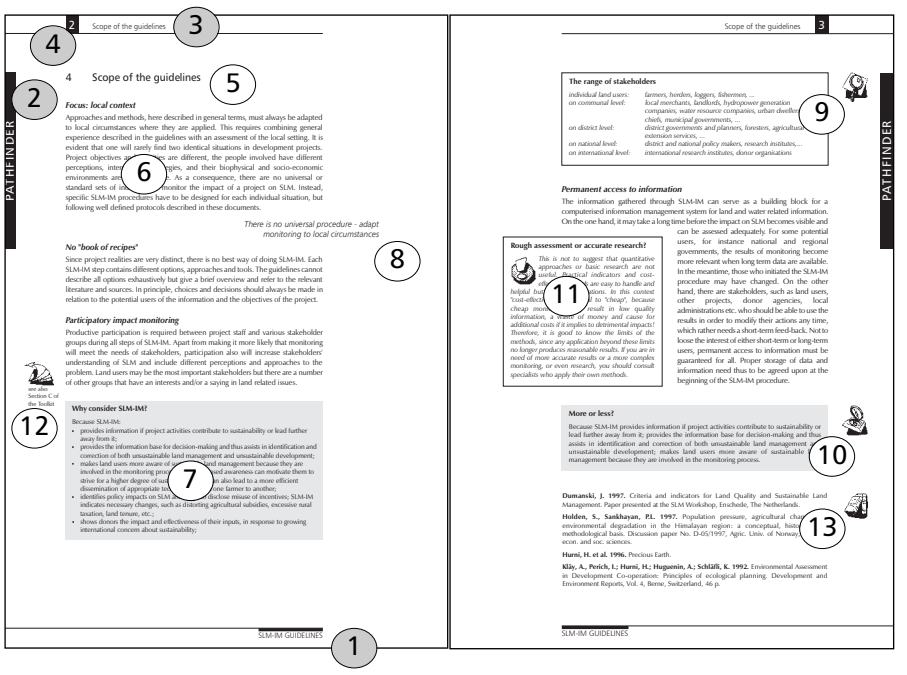
General elements of user orientation

General orientation is provided by the following means:

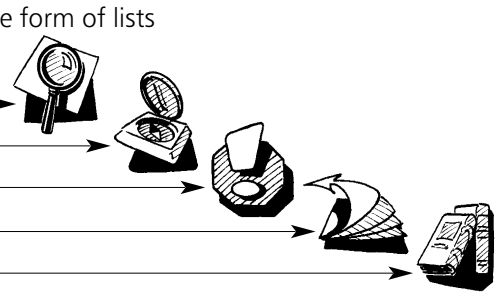
- The WORKBOOK has one general table of contents on the inside of both the front and back covers. The table of contents for each module is shown on the back of the title page of each module.
- Readers will find an executive summary at the beginning of the WORKBOOK, while the Sustainable Land Management Module and the SLM Impact Monitoring Module are introduced by their own brief module summary.

Page layout and graphic interface

1. document title
2. title of the module currently in use
3. chapter or monitoring step currently in use
4. page number



5. titles
6. main text
7. complementary information in the form of lists
8. key messages
9. examples
10. methodological hints
11. caution (pitfalls)
12. cross-references
13. bookshelf



2 Sustainable Land Management - Reasons for Impact Monitoring

Today, almost no development programme or project can afford to request funds without listing sustainable development as a key word among its goals and objectives. But in reality, the long-term goal of sustainability on the one hand, and day-to-day project implementation on the other hand, are not easily matched. For example:

- How can a project contribute to sustainable development if project funding is put at risk every second or third year?
- How can projects ensure a long-term impact leading to more sustainable development?
- Which tools can be used to observe this impact?

These questions show that development projects may have difficulties taking account of and monitoring their impacts on the land. But can any project that claims to contribute to sustainable development afford not to try monitoring its impacts? These Guidelines are designed to assist projects in bridging this gap.

Sustainability will remain an empty phrase if projects do not monitor their impacts

Because it deals with the basis of the global life support system, sustainable land management (SLM) plays a crucial role in sustainable development and poverty alleviation. Consequently, most projects aiming at sustainable development also have an impact on land quality, be it directly or indirectly. This impact, however, is often manifested after a considerable time lag, sometimes even after the expiration of a project. Therefore, monitoring the impact of projects on SLM (SLM-IM) must be designed for and ensured over a period of time beyond the end of a project. These Guidelines on SLM-IM are intended to assist project managers in improving the performance of their projects and reducing detrimental impacts. But SLM-IM appears to constitute additional work for already overburdened project staff. Why should they accept additional tasks?

Why consider SLM-IM?

SLM-IM:

- builds on and improves existing M&E procedures, and helps to assess the impacts of projects on human well-being and the environment (current M&E often focuses only on project performance);
- provides information for decision-making, improved project design and mid-course corrections;
- provides information to help determine whether project activities are moving towards sustainability or further away from it;
- helps to avoid negative or undesirable impacts of the project;
- makes stakeholders, particularly land users, more aware of sustainable land management because they are involved in the monitoring process;
- can lead to a more efficient dissemination of appropriate technologies from one land user to another;
- identifies policy impacts on SLM and indicates necessary changes, such as disclosing misuse of incentives and subsidies, improving rural taxation, land tenure, etc.;
- shows donors the impact and effectiveness of their inputs, in response to growing international concern about sustainability.

3 The Complete SLM Impact Monitoring - A Seven-Step Procedure

The complete SLM-IM procedure proposed in the Guidelines involves 7 main steps. Ideally, a project will carry out the complete process. But the flexible design of the Guidelines also allows for adaptation to many different situations and selective use of single steps, descriptions, and tools in the SLM-IM and Toolkit Modules.

Procedure, steps and key questions in SLM-IM

Step 1: Identification of stakeholders
A stakeholder can be anyone who has an interest in SLM activities, and who will eventually evaluate their usefulness. To make land management more sustainable beyond the lifetime of a project, stakeholders must assume responsibility for SLM-IM from the beginning.
Key questions for SLM-IM: Who can use SLM-IM results and for what purpose? Who will carry out the SLM-IM?

Step 2: Identification of core issues
Limited time and budgets make it difficult to address the complexity of SLM, and similarly, to monitor all its facets. Therefore, the most important land management issues, the so-called "core issues" of SLM-IM will be identified and monitored.
Key questions for SLM-IM: What is essential to make land management more sustainable? What is most important to monitor?

Step 3: Formulation of impact hypotheses
The core issues will eventually be addressed through SLM interventions, some of which may have unintended or even detrimental impacts on SLM in addition to the desired positive ones. The variety of possible impacts will therefore be estimated beforehand by formulating impact hypotheses.
Key questions for SLM-IM: Which impacts of project activities are desirable and expected? Can impacts other than the desired ones be expected?

Step 4: Identification and selection of indicator sets
To measure or observe the complexity of SLM, manageable and relevant simplifications - the so-called "indicators" - must be identified. For this purpose, a framework or structural model will be developed to assemble a meaningful set of indicators that reflects all aspects of sustainability - ecological, economic and social - and thus reveals a trend in land management.
Key questions for SLM-IM: How can indicators be searched? What indicates the sustainability of land management? How can we move from measurement to assessment?

Step 5: Selection and development of SLM-IM methods
SLM-IM methods to monitor the chosen set of indicators will be selected or need to be developed. Practical and cost-effective methods are preferred, because these remain more applicable than costly and sophisticated methods.
Key questions for SLM-IM: How can changes in land management be observed and measured? How can SLM-IM methods be developed?

Step 6: Data analysis and assessment of SLM
Firstly, the results will be analysed separately for each indicator, and secondly, SLM will be assessed as a whole. The fundamental question is whether all or only some aspects of land management show a higher degree of sustainablity than before.
Key questions for SLM-IM: Which principles need to be considered in analysing data? How can results be assessed in view of a contribution towards SLM?

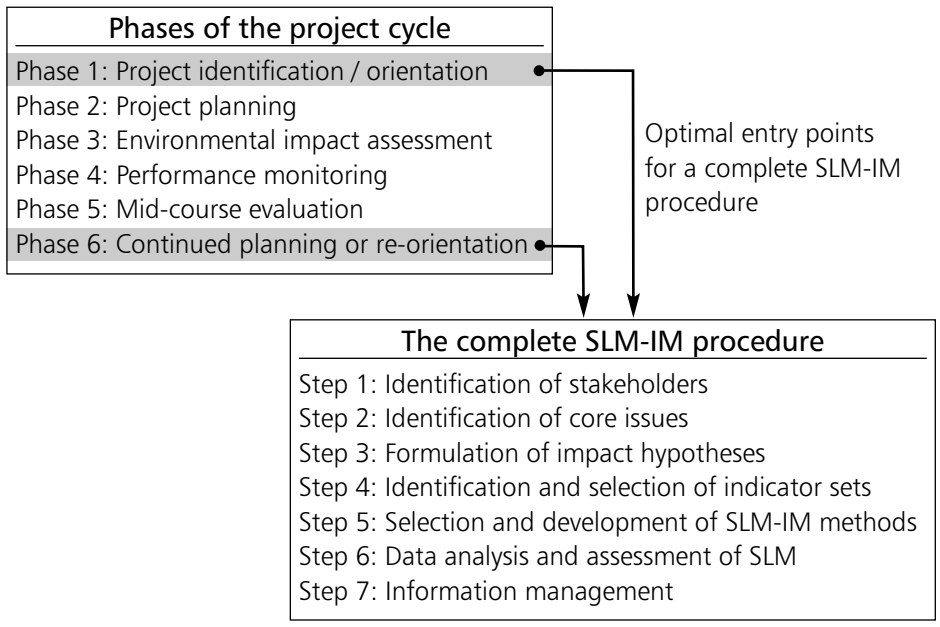
Step 7: Information management
Various stakeholder groups will use the same information, but each group has its own needs and interests. Outputs of SLM-IM will be presented and disseminated in languages and formats appropriate for different users. SLM-IM information will be stored in a way that makes it permanently accessible to everyone interested.
Key questions for SLM-IM: How can information be presented and disseminated in a user-friendly manner? How can information be stored accessibly for all stakeholders?

4 SLM Impact Monitoring in the Project Cycle

SLM-IM needs to be attached to or incorporated into existing project management activities. Optimal entry points for SLM-IM are the orientation and planning phases of a programme or project: before the project starts, or during a mid-course/re-orientation phase. These entry points will allow a complete SLM-IM procedure to be conducted as described in these Guidelines. The advantage of entering at these points is that various stakeholders can best be identified and involved. This is essential because effective long-term monitoring depends greatly on the active participation of all major stakeholders. Furthermore, impact indicators - in addition to performance indicators - can be included in the project matrix or logical framework from the beginning.

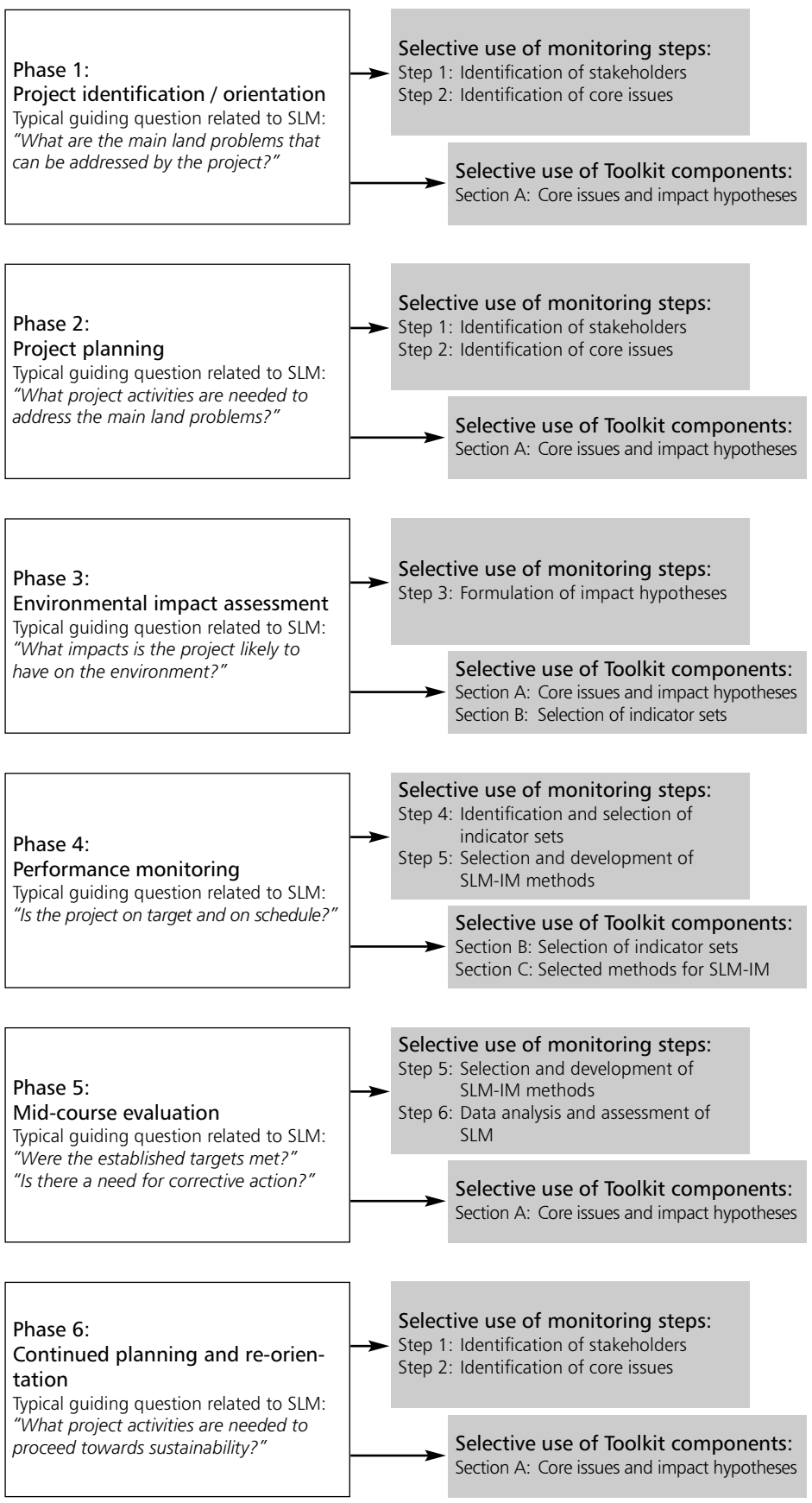
The orientation and planning phases of a project are optimal entry points for a complete SLM-IM procedure. However, during any other phase of the project cycle, single modules, chapters, steps and tools of the Guidelines can also be used selectively.

Where to fit a complete procedure of SLM-IM into the project cycle



Projects that have already passed phases 1 or 6 can make selective use of modules, chapters, steps and tools. For example, you are in the implementation phase of your project and you are already working with stakeholders, and have defined your indicators and monitoring methods. But you realise that the set of indicators is not sufficient to describe the project's impact. In this case, you would selectively use Step 4 of the SLM impact monitoring module (Identification and selection of indicator sets), and section B of the Toolkit Module.

How to make selective use of the Guidelines



5 Scope of the Guidelines

The local context

Approaches and methods, described here in general terms, must always be adapted to local circumstances where they are applied. This requires combining general experience described in the Guidelines with an assessment of the local setting. It is obvious that one will rarely find two identical situations in development projects. Project objectives and activities are different, the people involved have different perceptions, interests and strategies, and their biophysical and socio-economic environments are highly diverse. As a consequence, there are no universal procedures or standard sets of indicators to monitor the impact of a project on SLM. Thus, these Guidelines are not a blueprint. Instead, specific SLM-IM procedures have to be designed for each individual situation, but following well-defined protocols described in these documents. Each SLM-IM step contains different options, approaches and tools. The Guidelines cannot describe all options exhaustively; they give a brief overview and refer to the relevant literature and sources. In principle, choices and decisions should always be made in relation to the potential users of the information and the objectives of the project.

There is no universal procedure - monitoring must be adapted to local circumstances

Participatory impact monitoring

Productive participation is required between all stakeholder groups during all steps of SLM-IM. Apart from making it more likely that monitoring will meet the needs of stakeholders, participation also will increase a general understanding of SLM and include different perceptions and approaches to the problem. Land users may be the most important stakeholders, but there are a number of other groups that have an interest and/or a say in land-related issues.

The range of stakeholders

land users:	*women, men, elders, youngsters, farmers, herders, loggers, fishermen, ...*
at communal level:	*local merchants, landlords, hydropower generation companies, water resource companies, urban dwellers, local chiefs, municipal governments, ...*
at district level:	*district governments and planners, foresters, agricultural extension services, ...*
at national level:	*district and national policy makers, research institutes, ...*
at international level:	*international research institutes, donor organisations, ...*

Only the involvement of all major stakeholders can make long-term monitoring practical

Focus: practical tools

Long-term monitoring of changes can only be done if responsibility for SLM-IM is taken over by national and local institutions, organisations and individuals before a project ends. The use of highly sophisticated monitoring methods requires a great deal of time and money which many projects are not in a position to invest, let alone the local partners who are interested in continued monitoring. Moreover, the more complicated the methods, the more difficult it is to involve local institutions or stakeholders in SLM-IM. This implies that monitoring methods should be manageable and practical, requiring minimal time and financial input. A reasonable target for SLM-IM activities, for example, is 3-5% of the project costs. Therefore, the Guidelines emphasise indirect indicators and qualitative rather than quantitative assessment: soil colour rather than quantitative laboratory estimates of soil organic matter, and participatory wealth ranking rather than formal economic questionnaires, etc.

Practical and cost-effective monitoring increases the usefulness and continued application of monitoring beyond the termination of a project

Rough assessment or accurate research?

Quantitative approaches or basic research are the most accurate methods, but at the same time they are costly and difficult to manage for a development project. Practical indicators and cost-effective methods are easy to handle and helpful, but they have limitations. In this context, "cost-effective" is not equal to "cheap", because cheap monitoring may result in low-quality information and be a waste of money as well as cause for additional costs if it implies detrimental impacts! Therefore, it is good to know the limits of the methods, since any application beyond these limits no longer produces reasonable results. If you are in need of more accurate results or more complex monitoring, or even research, you should consult specialists who apply their own methods. It may be useful to establish contact with a local university or research institute willing and able to provide long-term services.

Permanent access to information

The information gathered through SLM-IM can serve as a building block for a computerised information management system for land- and water-related information. For some potential users - national and regional governments for instance - the results of monitoring become more relevant when long-term data are available. Other stakeholders, such as land users, other projects, donor agencies, local administrations, etc., should be able to obtain and use the results immediately in order to modify their actions any time, which requires short-term feed-back. To prevent users from losing interest, permanent access to information must be guaranteed for all major stakeholders. Proper storage of data and information, including user-oriented outputs, presentation, and dissemination, therefore needs to be agreed upon at the beginning of the SLM-IM procedure.

Only useful feedback mechanisms keep different stakeholders interested in monitoring

Sustainable Land Management

Guidelines for
Impact Monitoring

SUSTAINABLE LAND MANAGEMENT MODULE

The importance of SLM

Pathfinder Module Guidance for users
Sustainable Land Management Module The importance of SLM
SLM Impact Monitoring Module A seven-step procedure for SLM-IM
Toolkit Module A selection of practical tools and cost-effective methods

SUSTAINABLE LAND MANAGEMENT MODULE

Contents


I. M. Earning
M. D.

Module Summary

Sustainable land management (SLM) is the foundation of sustainable agriculture, and a strategic component of sustainable development and poverty alleviation. In contrast to the situation just a few decades ago, there are currently only a few countries in the world that still have spare land resources to meet the needs of their expanding populations. In the majority of cases, production must be increased and intensified on land already under cultivation. Furthermore, in most developing countries, the majority of people are still engaged in primary agriculture, livestock production, forestry and fishery, and their livelihood and options for economic development are directly linked to the quality of the land and its resources.

SLM seeks to harmonise the often conflicting objectives of intensified economic and social development, while maintaining and enhancing the ecological and global life support functions of land resources. SLM postulates that both these aims can be achieved simultaneously in a true win-win situation if things are done appropriately. In fact, practising SLM principles is one of the few options for land users to generate income without destroying the quality of the land as a basis of production. SLM impact monitoring (SLM-IM) assists in this process by providing methods and protocols for determining whether land management practices are moving in the direction of sustainability or not. In this way, it supports decision-making on project activities and helps to avoid project failures.

SLM can be approached by looking for symptoms of unsustainability, such as soil degradation, water quality decline, loss of biodiversity, increased incidents of plant diseases, etc. Such symptoms are a result of inappropriate land management and exploitation of resources, the causes of which are often societal and political rather than technical or agronomic. SLM can also be approached through analysing the options to manage the land sustainably. Key questions are: Why do land users apply inappropriate management practices, or what keeps them from applying more appropriate technologies? Frequently, land users are aware of degradation but are not in a position to correct it, often due to political and economic circumstances, such as market price distortions, insecure land tenure, misuse of subsidies and incentives, etc. that limit their choice of options to practise SLM.

SLM, therefore, addresses both processes of resource degradation and underlying causes of unsustainability, and indicates possible solutions. However, this requires understanding of the main driving forces that operate at each level - farm, community, region, nation - and the inter-connections between them. The procedure of applying SLM-IM is not one of identifying the best (magic bullet) choice. But when participatory processes are applied with all major stakeholders, SLM-IM becomes a tool for gaining insights and providing guidance on how to effect the necessary changes.

1 Concept and Principles of SLM

Sustainable land management (SLM) can be defined as the use of land resources such as soils, water, animals and plants for the production of goods - to meet changing human needs - while assuring the long-term productive potential of these resources, and the maintenance of their environmental functions

Sustainable land management (SLM) deals with essential elements of the global life support system. Since experience with the detrimental effects of resource exploitation has become widespread, there has been growing awareness that productive lands are getting scarce, land resources are not unlimited, and that the land already in use needs more care. The health and wealth of all people depend on the quality of the land resources, but those who are directly using them may be the first to experience decline in the quality of the land. In developing countries the majority are direct land users who have an immediate interest in using the production potential of their resources, but also in maintaining this potential as the basis for their livelihood and survival. SLM is a delicate balance of production and protection, and the overall goal of sustainable development cannot be reached without giving due consideration to SLM.

SLM plays a central role in sustainable development

The wealth of indigenous resource conservation practices indicates that unsustainable land management and degradation of resources is not always due to lack of awareness on the part of land users. Often, there is more reason for concern that political, social and economic factors limit land users' choice of options to manage land resources in a sustainable manner. For example, insecure land tenure prevents the necessary investment in land care; market prices do not reflect the costs for protection of land resources; conservation activities usually last only as long as inappropriate incentives and subsidies are paid.

In this context, SLM seeks to harmonise the complementary but often conflicting goals of production and environmental protection. The aim must be an agreed trade-off from farm level and community level to the international level. The central question is not how to preserve nature in a pristine state but how to co-exist with nature in order to maintain the functions of the land resources for the benefit of society in a sustainable manner.

SLM focuses on the functions of the environment for the benefit of society

The functions of land resources

Productive functions	to produce food, fodder, fuel, construction material, industrial goods, etc.
Physiological functions	to ensure human health by minimising toxic substances in water, soils and plants, or hazards such as landslides, flash floods, etc.
Cultural functions	to preserve creation and the integrity of the landscape: the role(s) of water, land, forests and animals as an essential part of the cultural heritage, and to maintain the historical and aesthetic value of the landscape
Ecological functions	to ensure maintenance of ecosystem functions and global life support functions, including source/sink capacity for greenhouse gases, filtering of water and pollutants, and maintenance of global geochemical (nutrient) cycles, etc.

It is necessary to take a critical look at the term "sustainability", which is frequently defined absolutely, uniformly or globally. But the concept of sustainability can only be put into practice within a real-life local context. The views and experiences of local land users - which are already included in locally adapted and accepted indigenous technologies - can serve as a basis and be incrementally supplemented by the views of external stakeholders, such as scientists, urban dwellers, politicians, etc. Sustainability should be thought of as a desirable direction in which to proceed rather than a goal in itself. Instead of using the term sustainability, one can talk about a higher or lower degree of sustainability. SLM impact monitoring (SLM-IM) is thus not meant to be used as a measurement against standards of, for example, soil or water quality. Rather, it is intended to be used for understanding changes and observing and establishing trends, indicating whether land management is moving towards or away from sustainability.

Sustainability

There is no standard definition of sustainability, because it incorporates several, at times even conflicting issues, which require reconciliation at local and policy levels:

- Individual perceptions: farmers, pastoralists, forest dwellers, fishermen, policy-makers, scientists, even men and women within the same family may define sustainability differently, according to their own attitudes and economic, social and ecological interests, which are often contradictory and need to be harmonised.
- Spatial considerations: water use in tropical highlands, for example, may be sustainable for the highlanders but unsustainable in adjacent lowlands, where it can cause water shortage; on a local scale, farmers who practice unsustainable land management in the upper part of a catchment can cause flash floods or decline in the quality of drinking water for urban dwellers far away.
- Temporal scales and perspectives: it is not possible - and probably also not desirable - to define sustainability today on behalf of the next generation. But it is possible to maintain the potential of the land resources so that future generations can develop their own values, priorities and possibilities to satisfy their needs.

Within a local context, SLM combines policies, technologies and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously:

- maintain or enhance production/services (productivity);
- reduce the level of production risk (security);
- protect natural resources and prevent their degradation (protection);
- be economically viable (viability is given e.g. if the contribution of the activity to income is sufficient to make its continuation attractive);
- be socially acceptable (acceptability is given e.g. if activities are negotiated among all stakeholders, when possible conflicts of interest are addressed and resolved, and when activities adequately meet the needs of poorer people).

These five objectives are known as the "5 pillars of sustainability", and they also represent five essential domains for SLM-IM.

Sustainability - and SLM - is a matter of compromising perceptions and objectives through negotiations among various stakeholders in a real-life local context

2 Looking at SLM from Different Perspectives

SLM requires a comprehensive understanding of a specific society within its environment. Usually, projects cannot wait until detailed studies are conducted and project activities need to be started as early as possible. In this case, there is a high probability that a lot of unexpected impacts will occur later on. To avoid negative effects, projects need a point of departure to enhance SLM. One of the main questions is, which activities or corrective measures can contribute to SLM? In this respect, the Guidelines suggest two approaches, by looking at SLM in terms of (1) unsustainability and (2) the choice of options land users have to manage their land in a sustainable manner.

Success story or negative example?

Many implementers prefer to base their activities on success stories in other parts of the world, such as an increase in production through reduced degradation. Positive examples offer development opportunities, but it is misleading to assume that they can easily be extrapolated to other areas. Negative examples are useful as a point of departure to identify limitations to SLM, assess why local stakeholders are not in a position to implement SLM under the given circumstances, and determine where to start incremental improvement.

Looking at SLM in terms of unsustainability

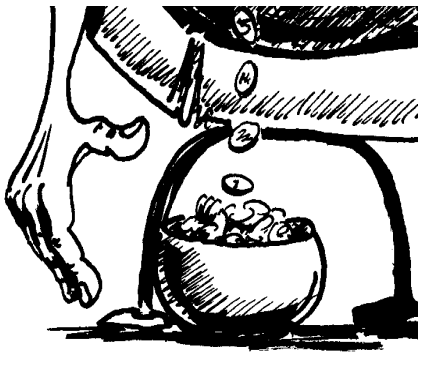
Analysis of unsustainable land management can start with the identification of land problems (some publications use the term "land issues"). These are often similar in areas with the same agro-ecological conditions. Symptoms or signs of resource degradation are indications of unsustainability and usually do not occur in isolation. Processes that start degrading one resource will soon affect other resources as well. For example, if drought prevents the growth of plants it leaves the soil bare and soil erosion is likely to occur during the next rain storm. In turn, soil erosion removes part of the fertile topsoil layer, which further limits plant growth. So it is necessary to identify a complex of related land degradation processes to properly design corrective activities.

Common land problems	Dominant zone of occurrence
Degradation of soil resources	
• Soil erosion by water	sub-humid (steep lands, semi-arid)
• Reduced topsoil depth (reduced water and nutrient retention capacity)	sub-humid (steep lands)
• Wind erosion/dust storms, mobile dunes	arid, semi-arid
• Nutrient depletion (loss of organic matter, acidity)	humid, sub-humid
• Salinisation & alkalinity (under-irrigation, over-irrigation)	arid, semi-arid
• Compaction/Crust formation	arid, semi-arid
• Toxicity: pollution by pesticides, nutrients, acid rain	sub-humid, industrial agriculture
Degradation of water resources	
• Depletion of groundwater table	arid, semi-arid
• Declining water quality	all
• Sedimentation of water reservoirs	all lowlands
• Increasing runoff, flash floods	all
Degradation of plant resources	
• Drought	arid, semi-arid
• Reduced biodiversity	all
• Reduced biomass and nutritive value	all
• Reduced plant growth and cover	all
• Plant diseases	all
Degradation of animal resources	
• Malnutrition	all
• Animal diseases	all
• Overstocking	all

Looking for symptoms of unsustainability is a useful point of departure as long as it is not restricted to resource degradation but accompanied by an attempt to look for the reasons behind such symptoms. Most obvious direct causes of degradation are related to inappropriate land management.

Symptom or disease?

If environmental problems are addressed only as symptoms, without due consideration of the socio-economic and political framework, this rather narrow approach (repair-shop mentality) will not result in the necessary changes that are supposed to lead to sustainable development!



Inappropriate land management	Dominant zone of occurrence
• Reduction and mismanagement of woodlands	sub-humid, humid
• Monoculture, inappropriate crop rotation	industrialised agriculture
• Increase in cultivation of marginal land	sub-humid (steep lands), semi-arid
• Overgrazing/rangeland degradation	sub-humid (steep lands), semi-arid
• Decreasing length of fallow period	sub-humid (steep lands), semi-arid
• Insufficient nutrient recycling	all

Again, the identification of inappropriate land management practices is only an intermediate step leading to another level where indirect causes of resource degradation need to be found.

Societal changes and policy issues that may lead to land problems

- Marginalisation of the poor
- Impoverishment
- Malnutrition
- Spreading of diseases
- Rapid population growth or rapid population decline (out-migration)
- Decreasing investment
- Conflicts over natural resources
- Insecure land tenure and property rights, particularly for women as household heads
- Inappropriate environmental regulations and enforcement
- Inappropriate incentives and subsidies
- Imbalanced land reforms
- Rapid modernisation and loss of indigenous knowledge
- Unrealistic prices for land products
- Instability of input prices
- Poor infrastructure
- Insufficient education, training, agricultural extension, etc.

Looking at SLM in terms of land users' choice of options

Land users trigger degradation processes through inappropriate land management. This fact raises two questions: a) what choice of management practices is likely to result in farming systems more sustainable than the current ones; b) what keeps land users from adopting these management practices and systems? A close look at the choice of options available to land users and at limiting factors to more sustainable land management helps to identify both economic options (e.g. proper resource allocation, off-farm income) and political strategies (e.g. secured land rights, tax abatements), rather than only technical options (e.g. relay cropping, irrigation, soil and water conservation).

Any improvement in land management options must be made within the bounds of the natural environment, but it must also optimise inputs, provide better returns on investment and labour, etc. The object of improvement is a step-by-step progression of management options.

Land users' choice of options depends on:

- individual skills, gender-specific experience and knowledge,
- cultural norms and values,
- the economic framework,
- and policies regulating access to and the control over natural resources.

The importance of the political framework

Land users are often aware of unsustainable land management but are not in a position to enhance SLM. Peasants in the Ethiopian highlands are highly aware of soil erosion and they have a complex system of practices and a protective structure to deal with the problems. The socio-economic and geo-political framework, however, is not always supportive of farmers' efforts. For example, until 1991, the civil war absorbed manpower needed for farming; insecure land tenure and associated insecurity prevented the necessary investments in SLM; insufficient infrastructure restricted the availability of agricultural inputs and the marketing of products, and an imposed price policy lowered the real values of agricultural products. Thus, even if there was awareness of the problem, as well as the skills and the will to implement solutions, the political setting severely limited the choice of options available to rural people.

Activity options for enhancing the sustainability of land management

As seen above, SLM can be pursued through two alternative but complementary approaches: (1) unsustainability and (2) land users' choice of options. Both approaches have their benefits and limitations and basically serve to raise awareness of land problems. They should be used according to the project's preferences and needs. Despite the differences, both approaches should basically lead to the same understanding: SLM needs to address resource degradation processes, land management practices, and the social, economic and political framework as well as their inter-linkages. If such systems are identified in a participatory manner involving different stakeholders, indigenous experience and external knowledge (scientific, interdisciplinary expertise, etc.) can form a broad, common pool of possibilities for enhancing SLM. Starting points for corrective action can be found from the farm plot to the national level.

Know the symptoms, the disease and the process

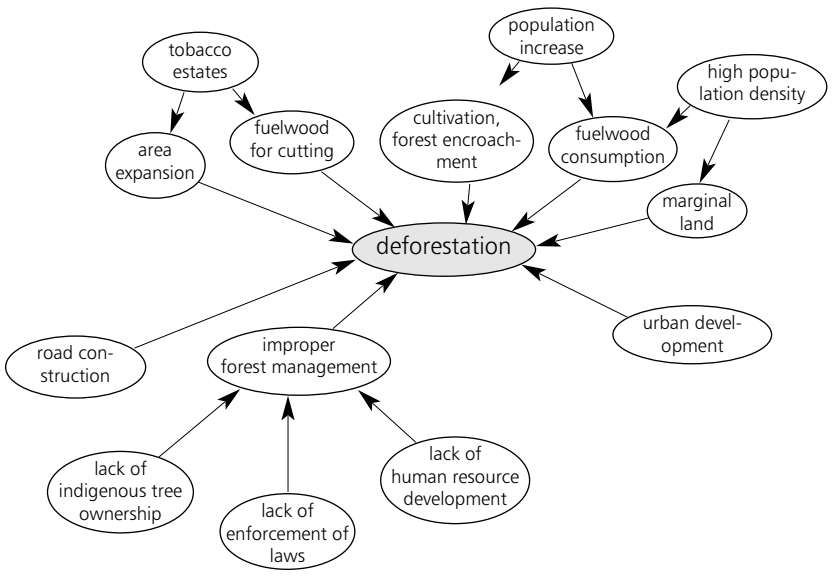
When searching for project activities that have a positive impact on SLM, it is important to consider not only technological options, but also activities that create awareness, improve knowledge, land management skills and local planning procedures, support training and education, enhance institutional development, and tackle important policy issues.

Where to intervene?

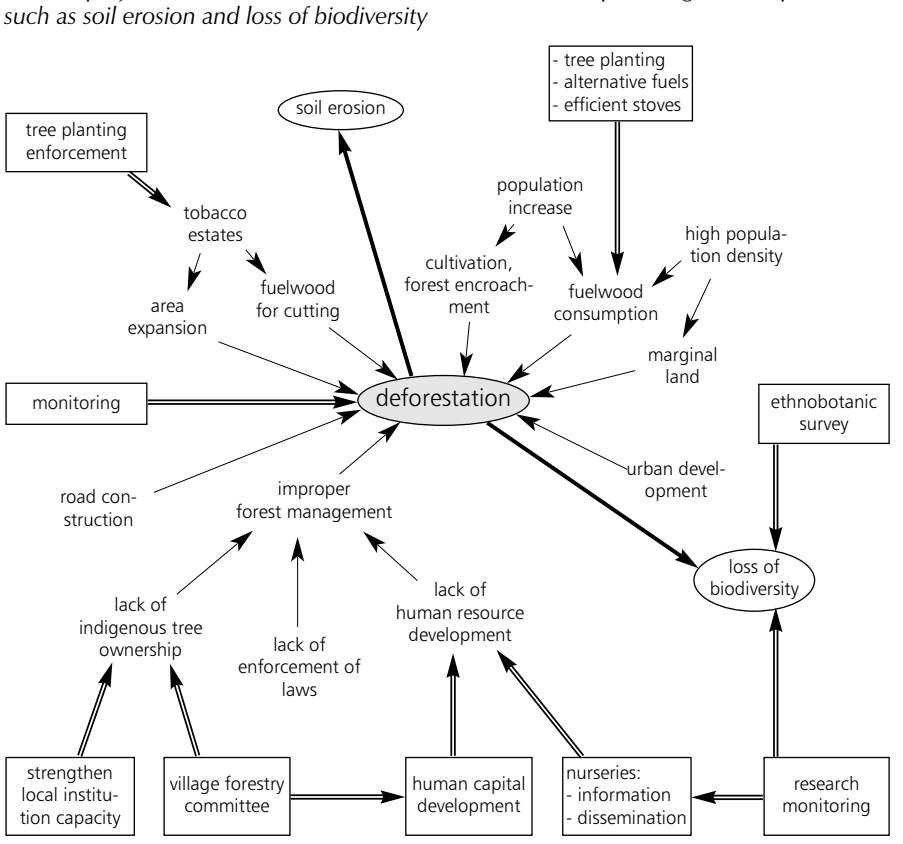
Projects are usually not in a position to intervene on all levels at the same time; they need to concentrate on those key points where their influence will probably be most promising; this may or may not be the point of highest cost-effectiveness. Country programmes should then seek to co-ordinate projects which enhance sustainable development from different angles. In this way, a holistic perspective can be maintained in the long run. The complex set of triggers of environmental degradation can be recognised; this leads to the development of appropriate strategies for corrective action.

Looking for possible project activities

"Forest sector issues" related to "deforestation"



Possible project activities to address deforestation and consequent degradation processes, such as soil erosion and loss of biodiversity



Triggers of environmental degradation	**Starting points** for corrective action
• *Land users are unaware of the consequences of land use activities*	*Providing information through extension services*
• *Land insecurity prevents investment in SLM*	*Land reforms*
• *Poverty prevents investment in SLM*	*Policies for poverty reduction along with redistribution of resources; agricultural and economic development*
• *Rapid population growth leads to cultivation of marginal land*	*Speeding up the pace of innovation and intensification; promoting trade and creating off-farm labour demand; improved education*
• *Rapid population decline leads to neglect in maintaining protective practices*	*Providing information and technical assistance to the remaining land users*
• *Policy failures create market imperfections, poverty and degradation*	*Structural adjustment programmes; removing market price distortions; promoting trade or securing access to resources*

Possible project activities on different levels

The table may be adapted to suit specific project conditions

	Activities: development of ...			
Levels	... technology	... human resources	... institutions	... policy
field/plot	soil and water conservation; agro-forestry; improved land husbandry;...			
farm	labour-saving technologies; improved storage and processing of grains;...	empowerment; awareness creation;...		
community		education and training; communication;...	adaptive research; capacity building, dissemination of information;...	
district				secure land rights; equal access and control over resources for both women and men; SLM-enhancing legislation; improvement of infrastructure;...

Dumanski, J. 1997. Criteria and indicators for Land Quality and Sustainable Land Management. Paper presented at the SLM Workshop, Enschede, The Netherlands.

Holden, S., Sankhayan, P.L. 1997. Population pressure, agricultural change and environmental degradation in the Himalayan region: a conceptual, historical and methodological basis. Discussion paper No. D-05/1997, Agric. Univ. of Norway, Dept. of econ. and soc. sciences.

Hurni, H. et al. 1996. Precious Earth: From Soil and Water Conservation to Sustainable Land Management. International Soil Conservation Organisation (ISCO), and Centre for Development and Environment (CDE), Berne, 89 pp. ISBN 3-906151-11-5.

Kläy, A., Perich, I.; Hurni, H.; Huguenin, A.; Schläfli, K. 1992. Environmental Assessment in Development Co-operation: Principles of ecological planning. Development and Environment Reports, Vol. 4, Berne, Switzerland, 46 p.

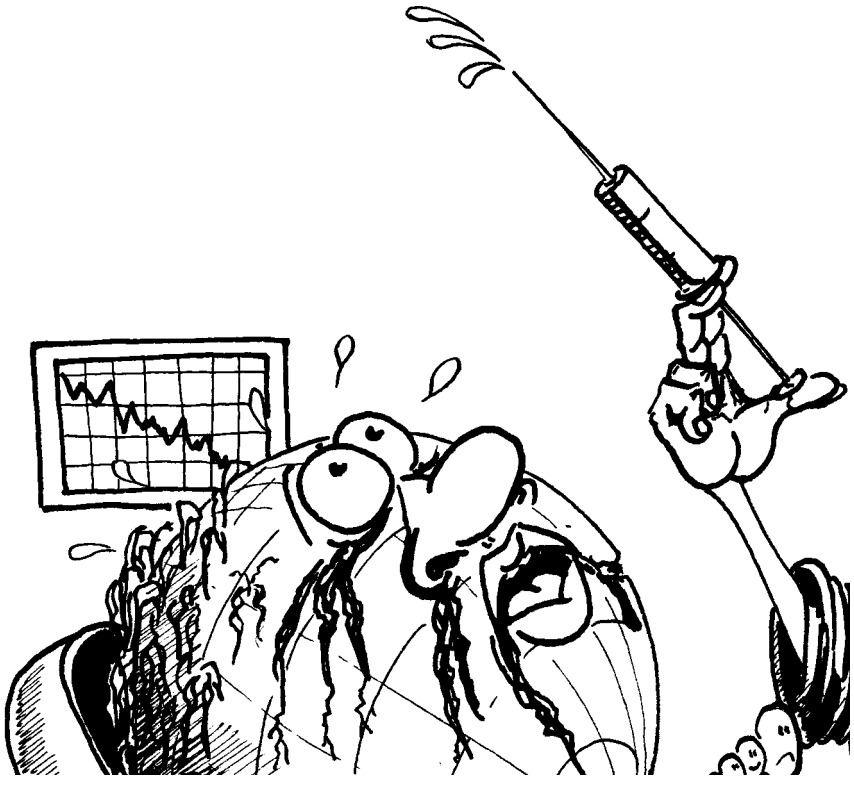
Smyth, A.J. and Dumanski, J. 1993. FESLM: An international framework for evaluating SLM. World Soil Resources Report No. 73, FAO, Rome, Italy.

SDC 1994. Agricultural Division: Sector Policy "Sustainable Soil Management".

Steiner, K 1995. Promoting Sustainable Soil Management in Development Cooperation. GTZ, 57 pp.

Templeton, S., Scherr, S. forthcoming. Population pressure and the microeconomy of land management in hills and mountains of developing countries.

Zweifel, H. 1998. The realities of gender in sustainable land management. Inputs for reflection and action. Development and Environment Reports, No. 16. CDE, Berne.



Sustainable Land Management

Guidelines for
Impact Monitoring

SLM IMPACT MONITORING MODULE

A seven-step procedure for SLM-IM

SLM IMPACT MONITORING MODULE

Contents


PM
PPM

Module Summary

Development activities or interventions need to be adapted to their changing environment from time to time. Appropriate adaptation requires a minimum of information about the general trend in land management. This information can be obtained through SLM impact monitoring (SLM-IM) and be made available to all stakeholders concerned with SLM. Stakeholders have a diversity of perceptions and interests, but also a diversity of knowledge, which represents a huge potential for SLM. Therefore, stakeholders' participation is essential throughout the SLM procedure. The complete procedure is a sound framework consisting of seven steps, each of which presents alternative tools that assist the user in tailoring his or her own SLM procedure.

Step 1: Identification of stakeholders. Land users, traders and merchants, decision- and policy-makers, desk officers, managers and staff of development organisations, researchers, and many more are potential beneficiaries of SLM or may contribute to it. They all use SLM-IM information for their own purposes. Stakeholder analysis is the tool for identifying who can be involved in SLM and SLM-IM. Some of the stakeholders may later on assume responsibilities for SLM-IM, data analysis, storage and dissemination of information. All the following steps in SLM-IM need to be developed and defined, together with the stakeholders concerned.

Step 2: Identification of core issues. SLM is a system too complex to be monitored in great detail. Selection is required by practical considerations, such as the need to produce results within a short time and with limited resources. The stakeholders need to agree upon the most relevant and important issues, the so-called "core issues" to be addressed by SLM-IM.

Step 3: Formulation of impact hypotheses. In defining the core issues of SLM and SLM-IM, possible interventions and activities will automatically emerge. Usually, these interventions are designed to enhance SLM and their impact is assumed to be positive. However, they may cause unintended and detrimental impacts as well. To avoid unnecessary complications, it is necessary to estimate all sorts of impacts by formulating impact hypotheses.

Step 4: Identification and selection of indicator sets. Indicators are simplified representations of a more complex reality. An ideal indicator set covers ecological, economic and social aspects of sustainability and a range of levels from the household to the region. The set of indicators to be assembled is not a group of separate variables but represents components of one land management system. Thus, frameworks and structural models are introduced that assist in the search for a meaningful and inter-related indicator set. Monitoring such a set reveals the actual trend in SLM. For each indicator as well as for the entire set, target values and criteria to assess changes will be defined jointly. What will be considered satisfactory? Which stage of SLM should be reached, and at what point in time?

Step 5: Selection and development of SLM-IM methods. In general, SLM-IM methods should be selected in view of those who will apply them beyond the life-time of a project. Therefore, the Guidelines give priority to practical and cost-effective methods. Beyond this, users are encouraged to develop and document their own methodological experience and thus adapt the Guidelines to their situation.

Step 6: Data analysis and assessment of SLM. In a preparatory phase, each indicator will be analysed individually, according to the criteria that were jointly defined in Step 4. During the main phase of assessment, the results of all indicators will be compared to determine whether all objectives were met (more sustainable land management), whether some were not met (conditional sustainability) and why not.

Step 7: Information management. A user-oriented presentation and dissemination of SLM-IM results require more than writing a single report. Understandable and attractive outputs, which meet the needs of different stakeholders must also be available. Decisions need to be taken on what to store, and where and how, so that all stakeholders have permanent access to the information.

During SLM-IM, unexpected costs, lack of experienced monitoring staff, or insufficient infrastructure may constitute limitations for single projects carrying out SLM-IM on their own. Proposals are made for examining alternatives and establishing joint SLM in different projects and institutions in a certain area.

Introduction

The Impact of Development Activities

SLM - impact monitoring (SLM-IM) makes changes in land management apparent. Such changes are the result of a combined influence of the society's own internal mechanisms of development, and external political, economic and environmental factors, one of which may be a development programme or project. The mere existence of a project already has an impact on its surroundings, even before any project activity has started: it creates expectations which change peoples' behaviour. After some years, it is quite difficult to tell which factor caused which change, and it is hardly possible to isolate the project's impact from any other influence.

If this is so, does SLM-IM make sense for a development project? Monitoring changes in land management is a process of learning about the man-environment relationship. To be more effective and realistic, any decision-maker, be it a land user, a policy-maker, or a project manager reviews his or her decisions and activities from time to time and adapts them to the changing situation. For this purpose, it is necessary to estimate the direction and the extent of change, and which factors are involved. Proper adaptation of decisions and actions requires a minimum of information, and SLM-IM provides this information with reference to SLM.

SLM-IM is a tool for decision-makers - e.g. farmers, policy-makers or project managers - to better adapt future activities to a changing world

Participatory SLM-IM

Facing a diversity of perceptions and interests

SLM usually involves many different stakeholders, all of whom have a particular perception of and interest in the land. Misuse of land resources affects future production, and temporal trade-offs must be made, regarding the extent to which the resources should be used, and what investment in SLM will be necessary. In principal, ignoring the needs and interests of any stakeholder group may result in missing the target of SLM. Certainly, common understanding among all stakeholders would facilitate SLM, but conflicting perceptions, interests and power constellations may be a serious obstacle. Participatory SLM-IM brings stakeholders together, helps in formulating a common goal and harmonises conflicting interests.

Participation means revealing and managing conflicting interests

Using diversity of knowledge

The variety of perceptions and interests among different stakeholders should primarily be considered a huge potential for SLM. The "internal" stakeholders, such as land users and other local community members, will contribute indigenous practices which are already accepted and adapted to the local environment. The "external" knowledge base of researchers and experts will add experiences from other parts of the world that optimise indigenous techniques and provide alternatives. Thus a broader knowledge base is created. The theoretical knowledge of legal advisors and policy-makers should be used to design a land policy that encourages land users to practice SLM. In this context, SLM-IM is a learning process for all stakeholders and helps in combining efforts to make land management more sustainable.

Participation increases development options and the potential for SLM

Where to involve stakeholders in SLM-IM

SLM-IM is designed as a participatory process, and stakeholders' involvement is not only important but essential throughout the SLM-IM procedure:

- Steps 2 and 3: During the identification of core issues and the formulation of impact hypotheses, stakeholders express their views, perceptions and needs and thus make the SLM-IM procedure more transparent and paving the way for discussion and negotiation.
- Step 4: Participatory identification and selection of indicators further deepens understanding of different perceptions and provides more alternatives for procedure. From a scientific point of view, including indigenous indicators means making SLM-IM duplicable for everyone, and not only for subject matter specialists.
- Step 5: Participatory selection and development of SLM-IM methods assures that the methods reflect the capacity and capability of those stakeholders who will carry out long-term SLM-IM beyond the life-time of a project.
- Step 6: During data analysis and assessment of SLM, it is important that all stakeholders understand what the results represent and realise that data processing is

not limited to adding up numbers. If the results are unclear, the necessary action will not follow.

- Step 7: To make sure that the information reaches all stakeholders, participatory SLM-IM helps to design a truly user-oriented form of information management, involving user-friendly outputs, presentation, dissemination, and storage of data appropriate for each stakeholder group.

Stakeholder participation is essential throughout the SLM-IM procedure

Establishing an SLM Impact Monitoring Procedure

It is often a project or programme manager who initiates SLM-IM, who initially supervises staff that apply monitoring methods, and who organises training in SLM-IM. For the initiator of SLM-IM it is important to survey the entire procedure, because all steps in SLM-IM must be designed in the beginning. Important decisions, for example concerning information management - the last step in SLM-IM - need to be made as early as possible. It is therefore advisable to read through all steps first.

These Guidelines provide a sound basis for SLM-IM in 7 steps. Beyond this framework, the Guidelines explicitly disclaim promotion of one fixed and seemingly "best" tool per step, but supply alternative tools, such as a framework, structural models, indicators, or monitoring methods. Each step in the SLM - Impact Monitoring Module contains basic information supported by methodological hints, examples, pitfalls (caution!) and other elements. Alternative tools and examples are presented in the Toolkit Module. This will assist you in establishing your own procedure tailored to your specific situation. Whether you agree to carry out the entire SLM-IM procedure, or whether you want to use steps and tools selectively, is up to you.

Comparability of data

After SLM-IM has been conducted for the first time, unsatisfactory results may call for an adaptation of the SLM-IM procedure and tools. However, we strongly recommend thorough design of the entire SLM-IM procedure, including the selection of core issues, impact hypotheses, indicators and methods, at the outset. A substantial modification of SLM-IM at a later stage may mean that data collected by different methods are no longer comparable! In this case, SLM cannot be assessed appropriately. Should it nonetheless be necessary to modify the SLM-IM procedure, consider how to relate the previous tools and data to those that have been modified.

Effective SLM-IM must be flexible for adaptation to any specific situation

Step 1 Identification of Stakeholders

Who plays a role in SLM-IM?

Anyone who is concerned with the objectives or activities of a project or programme, who may benefit or suffer from the impact of development activities, or who can influence the outcome of development activities is actively or passively "holding a stake" in SLM and, consequently, in SLM-IM. For example:

- Land users and local groups will be the main beneficiaries of the project. They have a tremendous wealth of experience and knowledge about how to manage land resources. Depending on the division of roles and labour, there is a gender-specific land management knowledge base. Women and men often consider different aspects of resources, such as the productive aspect of cultivated land or the health aspect of forests harbouring medicinal plants. Land users are the main actors in implementing SLM beyond the life-time of a project. SLM-IM information is useful for exchanging experiences among land users, adjusting land management operations, and verifying whether their interests are met according to their own criteria.
- Traders and merchants have an economic interest in a region. They are important in supplying appropriate inputs needed for SLM. They assure marketing of land products and may thus increase the economic attractiveness of SLM to local land users. They use SLM-IM information to optimise supplies and meet demands.
- Representatives of local and district institutions and NGOs have a considerable say in the economic, cultural and political framework, which can either enhance or hinder SLM. Furthermore, they normally have links to national institutions, and are part of the policy-making process. They can assist in organising the SLM-IM and appropriate dissemination and storage of information. They use SLM-IM information in dealing with political issues, such as land tenure or access to natural resources.
- Project managers are the ones who initiate the SLM-IM procedure and identify other relevant stakeholders. They are in need of SLM-IM information for planning appropriate project activities, making mid-course corrections, and justifying decisions to beneficiaries and donors.
- Staff of development organisations and national partner organisations may initially carry out SLM-IM, and also provide training in SLM-IM. They use SLM-IM information as feedback on their own work, and they also play an important role in the storage of data.
- National and international researchers support development activities. They may not be working in the project area, but they can use SLM-IM information to adapt land management technologies, to improve scientific models, and to develop recommendations for a wider audience. Later on, their research results will be used to improve SLM and their methodological results will improve the SLM-IM procedure.
- Desk officers of donor organisations are responsible for proper resource allocation in their agencies, and for ensuring that development activities are in line with their goals, such as sustainability or poverty alleviation. They need SLM-IM information to follow up the quality of their investments.

How to start a stakeholder analysis

"Stakeholder analysis" identifies a project's key stakeholders, assessing their interests and the ways in which their interests are linked to the project. It helps to identify appropriate forms of stakeholder participation and creates awareness of gender-specific potentials for SLM. The analysis should always be done at the beginning of a project, even if it presents only a quick list of stakeholders and their interests.

From a project's point of view, stakeholder analysis must involve as a minimum requirement

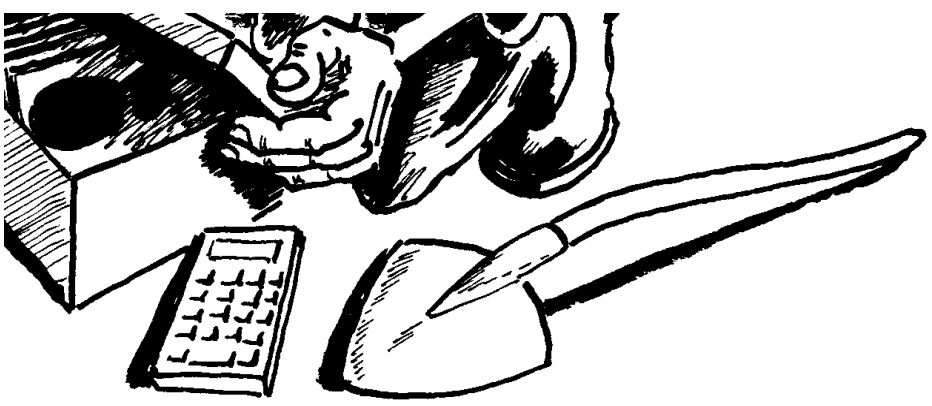
- a list of all possible stakeholders and their interests;
- an assessment of stakeholders' relative power and influence;
- stakeholders' importance to the project, their possible contributions to the success of its activities, and possible risks that might affect the project's successful implementation:
  - positive relations between stakeholders can be used as an entry point for project activities or as a catalyst for SLM activities;
  - conflicts of interest between stakeholders might hinder progress if they are ignored.

Positive relations with and among stakeholders are entry points for successful implementation of development activities

Initial questions

A set of well-designed questions can be a good start for getting into discussions with stakeholders. IUCN suggests:

- *In what way is your environment changing?*
- *Which problems have resulted from those changes, and which have always been there?*
- *How is your environment being affected by others in ways which seem out of your control?*
- *How are you affecting other people's lives?*
- *Who knows what about the environment?*
- *Who else shares your problems or has similar ones?*
- *What are your aspirations? Who is your role model?*



Stakeholders' assessment in a soil conservation project in Nicaragua

In the planning document for its second phase of implementation (1994-1996), the Programme for Sustainable Agriculture in Central American Hillsides (PASOLAC) included several indicators of improved soil properties after conservation practices had been adopted by farmers. Farmers themselves were to evaluate the expected improvement in early 1996. At the beginning a "translation workshop" was organised to translate the planning matrix into a language acceptable to evaluating and visited farmers. 12 institutions working in 3 different regions of Nicaragua were involved. In each region, each institution, represented by 3 farmers, visited the working area of another institution.

The visits were divided into two parts. During the first day, the 3 farmers visited between 3 and 6 individual farms. Their observations were organised according to key questions (indicators) discussed in the "translation workshop". In the evening, they gathered to discuss their findings. On the second day, meetings were held between the 3 farmers and the visited community. The visiting farmers presented their information and evaluation of soil conservation practices and their effects. The community members gave their opinions and further information. Finally, the adoption rate at community level, comparing 1994 and 1996, was estimated by the visiting farmers. During each visit 2 university staff members acted as secretaries to report farmers' comments. One technician of the institution visited joined the meeting with the community but had no right to interfere. At the end of the "evaluation cycle", a workshop was held in each region with only the evaluating farmers.

A national workshop at the end (again only with farmers) helped to fine-tune the evaluation report (PASOLAC 1996 a). A document was produced about the methodology used (PASOLAC 1996 b).The methodology was inspired by the "beneficiary approach" developed by L. Salmen of the World Bank.

Who will carry out SLM-IM?

The SLM-IM team must ensure that the SLM-IM procedure delivers results of a quality appropriate to the purpose and is cost-effective at the same time. The SLM-IM team will initially consist of project staff and other stakeholders. In the long run, specific and formal efforts should be made by project staff to train the local monitoring staff, so that eventually SLM-IM can be carried out without any project involvement.

Composing the SLM-IM team

The following aspects must be taken into account:

- fairness and objectivity in the perception of SLM: "internal" and "external" views need to be integrated;
- multi-disciplinary expertise: experience in data collection, analysis and in setting up an SLM-IM system is desirable;
- gender-orientation: a team composed of both women and men facilitates an appropriate and gender-specific approach to different stakeholders;
- capable local team members: post-project SLM-IM must be assured;
- co-ordination capacity: data collection and data use must involve other institutions;
- communication capacity: the participatory procedure of SLM-IM requires a communicative team, able to address and resolve conflicts between stakeholders.

Blauert, J. 1995. Creating local agendas (B). Participatory planning and evaluation methods: Suggestions for complementary methodologies. GTZ 402/95 18e (B)RMSH/NARMS Abt. 402, GTZ, Eschborn, Germany.

Davis-Case d'Arcy 1992. The community's toolbox. The idea, methods and tools for participatory assessment, monitoring and evaluation in community forestry. FAO, Forestry Paper No. 311, FAO, Rome, Italy.

Feuerstein, M.-T. 1986. Partners in evaluation: evaluating development and community programmes with participants. Macmillan Publishers Ltd, London, UK, 196 p.

Germann, D. and Gohl, E. 1996. Participatory impact monitoring. I.: Group-based impact monitoring. Deutsches Zentrum für Entwicklungstechnologien (GATE), Eschborn, Germany, 28 p.

Germann, D. and Gohl, E. 1996. Participatory impact monitoring. II.: NGO-based impact monitoring. Deutsches Zentrum für Entwicklungstechnologien (GATE), Eschborn, Germany, 38 p.

Germann, D. and Gohl, E. 1996. Participatory impact monitoring. IV.: The concepts of participatory impact monitoring. Deutsches Zentrum für Entwicklungstechnologien (GATE), Eschborn, Germany, 36 p.

Hagmann, J, Muriwa, K., Chuma, E. 1996. Learning together: development and extension of soil and water conservation in Zimbabwe. Quarterly Journal of International Agriculture, Vol. 35, No. 2.

Hagmann, J., Chuma, E., Muriwa, K. 1996. Kuturaya (let's try); participatory research, innovation and extension. ILEIA Readings in sust. agric.; Farmers' Research in Practice: 153 - 173.

IIED Sustainable Agriculture Programme 1995. Trees and trade-offs: a stakeholder approach to natural resource management. Gatekeeper Series no.52, p.5-6

IUCN 1997. (International Union for the Conservation of Nature and Natural Resources). An approach to assessing progress towards sustainability - tools and training series. IUCN/IDRC, Gland, Switzerland.

ODA 1995. Guidance note on how to do stakeholder analysis of aid projects and programmes. http://www.oneworld.org/eufiric/gb/stake1.1.htm

PASOLAC. 1996 a. Evaluación Participativa por Beneficiarios, 1996. Managua.

PASOLAC. 1996 b. Sistematización de la metodología de la evaluación participativa por beneficiarios, 1996, PASOLAC. Managua.

Schwarz, B., Germann, D. and Gohl, E. 1996. Participatory impact monitoring III. Application examples. Deutsches Zentrum für Entwicklungstechnologien (GATE), Eschborn, Germany, 68 p.

Swiss Development Co-operation 1997. Monitoring - keeping in touch with reality. Series of working instruments for planning, evaluation, monitoring, tranference into action., Strategic Controlling Unit, Berne, Switzerland, 2 Volumes, 77 p.

Werner, J. 1993. Participatory development of agricultural innovations - procedures and methods of on-farm research. Schriftenreihe der GTZ, No. 234, GTZ, Eschborn, Germany, 251 p.

Zweifel, H. 1998. The realities of gender in sustainable land management. Inputs for reflection and action. Development and Environment Reports, No. 16. CDE, Berne.

Step 2 Identification of Core Issues - What Should be Monitored?

What are core issues?

Stakeholders actively involved in SLM-IM are confronted with a large number of land management issues (sustainability aspects, land problems, system elements, processes, etc.). At first glance, most of them seem worthy of consideration in development activities. But limited time and budgets make it virtually impossible to cover and monitor everything desirable. In addition, if too many details are considered, the overview may be lost and details may not be covered satisfactorily. The most important and most relevant issues to monitor, the so-called "core issues" of SLM, depend largely on the interests and perceptions of different stakeholders. So identifying the core issues is a first crucial test of participatory SLM-IM. It is a preparatory process for selecting the definite and more specific indicators. The following methodological hint presents one possibility for identifying core issues of SLM-IM.

You cannot monitor everything;
make a relevant and realistic choice

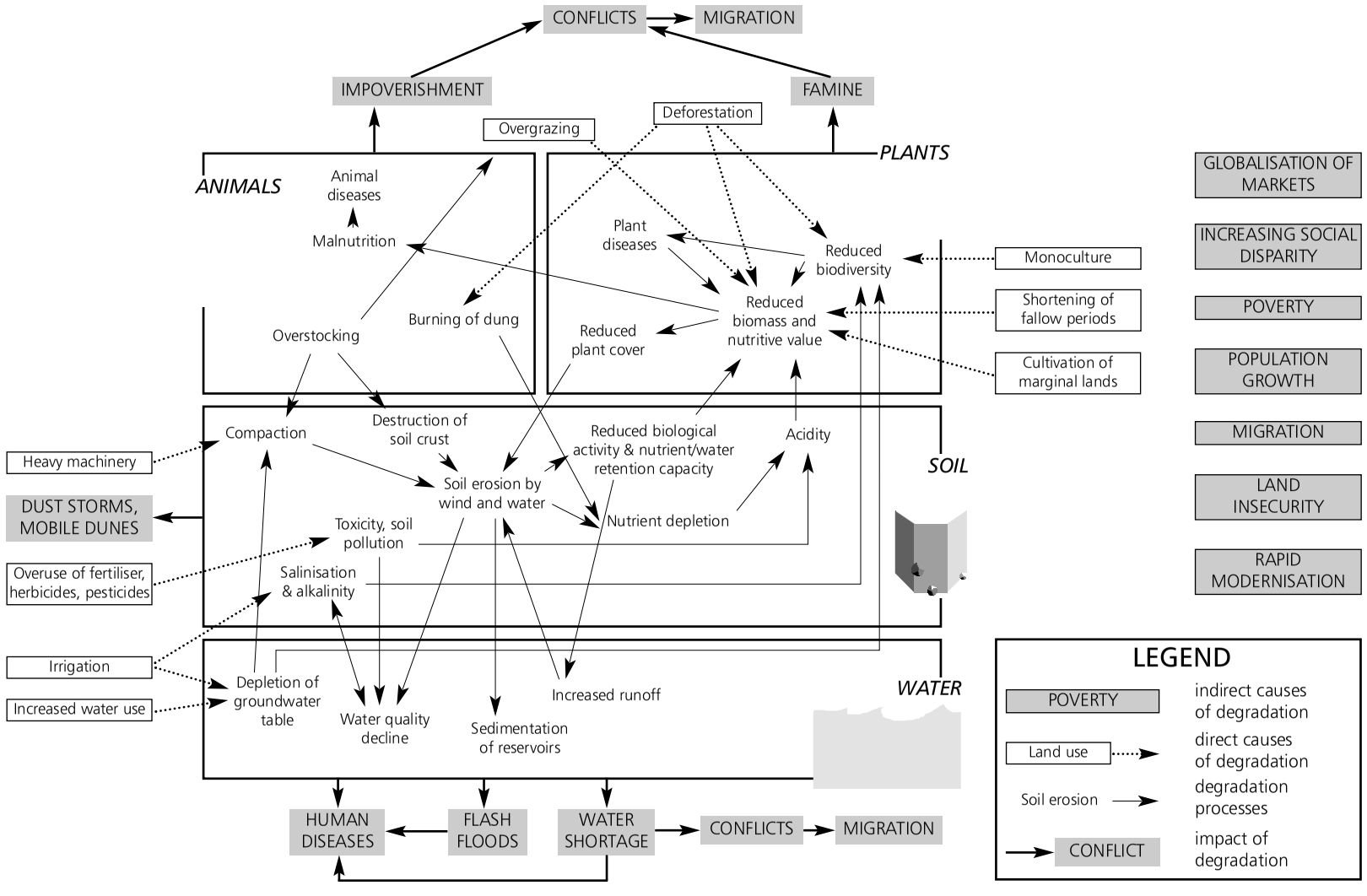
Identifying core issues of SLM-IM - The inter-relationship of society and resource management

There are basically two ways to begin work according to the flow diagram below. If you have a socio-economic background, you may prefer to begin with the identification of societal changes or problems along the margins of the diagram. If you have a biophysical background, you may wish to start with the resource degradation symptoms in the centre of the diagram. Either way will eventually lead you to the inter-linkage of society and land resources.

- Along the margins of the diagram you will find societal problems (e.g. land insecurity, poverty, migration, etc.) that could be causes and/or effects of resource degradation. Identify apparent societal problems in your area and define their relationship to land management problems (e.g. cultivation of marginal lands, deforestation, overgrazing, etc.) by adding arrows between the different components. You may also observe issues other than those included in the diagram. Add them and try to find their links with other components. Land management problems often result in resource degradation, the facets of which are indicated in the centre of the diagram.
- The centre of the diagram contains four examples of land resources. Identify the symptoms of resource degradation prevailing in your project area (e.g. reduced biodiversity, salinisation, water quality decline, etc.). Follow the arrows forward and backward and notice how different symptoms are inter-linked. In your area you may observe symptoms other than those included in the diagram. Add them and try to find their connections with other symptoms. These degradation processes may have different impacts on the society, examples of which are indicated by arrows leading from the centre to the margins of the diagram (e.g. water shortage, famine, etc.).

Note that the society experiences the degradation of water, plant and animal resources directly. Degradation of the soil resource, by contrast, is mostly felt indirectly through its detrimental impacts on the other resources. Therefore, soil degradation is often not perceived as a problem until the damage is considerable and corrections are costly!

see also sections A and B2 of the Toolkit



SLM IMPACT MONITORING

Agreement on core issues

Local stakeholders in particular have long "internal" experience in managing their environment. Thus they also have an opinion on what needs to be done and what should be monitored. As a cross-check on these "internal" opinions, "external" stakeholders such as project personnel are advised to make their own preliminary assessment of what they find important. This cross-check will enable them to formulate their own opinion about the prevailing core issues. But it should not be forgotten that this represents only one view and is not the only possible perception! It will provide additional alternatives for the general debate with other stakeholders, the aim of which is to reach an agreement on the core issues of SLM-IM.

Bellows, B. 1996. Indicators of sustainability. Workbook for the SANREM CRSP. Washington State University/University of Wisconsin, USA.

Defoer, T., De Groote, H., Hilhorst, T., Kanté, S., Budelman, A. (forthcoming). Farmer participatory research and quantitative analysis - a fruitful marriage? Journal of Agriculture, Ecosystems and Environment.

Hurni, H. Ludi, E. 1998, with the assistance of an interdisciplinary group of contributors (1998, forthcoming): Reconciling conservation with sustainable development. A participatory study in villages inside and around the Simen Mountains National Park, Ethiopia.

Kläy, A., Perich, I.; Hurni, H.; Huguenin, A.; Schläfli, K. 1992. Environmental assessment in development co-operation: principles of ecological planning. Development and Environment Reports, Vol. 4, Berne, Switzerland, 46 p.

Vester, F. 1986[2]**.** Ballungsgebiete in der Krise. DTV, 151 p.

Step 3 Formulation of Impact Hypotheses

From core issues to impact hypotheses

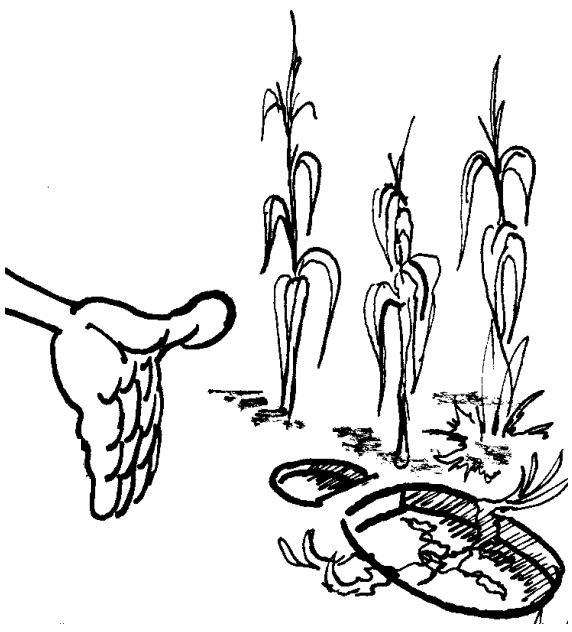
The core issues are those issues in the land management system under consideration that are found to be most relevant. Many stakeholders will have their own opinion about which interventions will improve land management and make it more sustainable. It is assumed for the most part that the proposed interventions will have a positive impact. However, because SLM is a complex system, they can cause a number of impacts, desirable and detrimental, planned and unexpected. Likewise, an impact may not be restricted to the specific core issue addressed but may influence other issues as well. So before starting any intervention, it is necessary to estimate all its possible impacts by formulating impact hypotheses. If this is not done, negative impacts may keep a project busy with corrective action, and it may eventually lose sight of the goal: SLM.

Assessing the impacts of project activities ahead of time

Proposals for SLM-enhancing interventions or activities are collected from all stakeholder groups. Thereafter, they will be invited to estimate which impact (on land management) they expect from each intervention (in which direction they want it to go, to what degree they want change, what the modalities will be, etc.). The different hypotheses will again reflect various perceptions, interests and expectations, and again, the wide range of views will help to critically compare different scenarios and options. The debate makes it easier to segregate the most realistic options and also to create awareness of a number of unintended impacts. It may thus avoid costly corrective action at a later stage. Whether the predicted or other impacts take place and why will be tested during the following steps of SLM-IM.

see also sections A and B2 of the Toolkit

Proposed project activities may have more than the intended positive impact!



The variety of impact hypotheses

SLM activity: terracing on steep slopes to reduce soil erosion. Possible impact hypotheses from the point of view of the ...

	... Ministry of Agriculture	***... local farmers***	***... project***	***... local merchants***
desired impact	*soil loss reduced; soil fertility maintained; production improved*	*incentives and subsidies received; crop yield increased*	*technology adopted by farmers inside and outside the project area*	*demand for tools and inputs increased; supply of agricultural products increased*
undesired impact		*labour demand for soil conservation increased*	*incentives become more important than conservation*	*competition of merchants increased*

Beyond these expected impacts (desired and undesired), the following may occur unexpectedly:

unexpected impact	*no adoption of the technology*	*problems turning the ox-plough; rodents settling in and waterlogging behind the structures*	*no adoption of the technology*	

Unexpected impacts

Farmers were assisted through a project nursery in planting grass on contour bunds in order to provide more fodder and thatching material. Unfortunately, the grass planted harboured snakes and harmful crop pests. Farmers found that the presence of these pests outweighed the benefit of the additional grass. The project now needs to re-consider the grass nursery programme, or look into ways of managing the grass (through species selection or cultural practices) which will minimise the effect of the harmful pests. This type of "in situ" *analysis of observations on unintended consequences or impacts can directly feed into the project process in order to improve the delivery of outputs. But when deciding on corrective actions, their possibly detrimental effects must be estimated simultaneously by formulating new impact hypotheses.*

Side effects

Planting a particular fodder tree species on contour bunds was selected as an indicator that farmers are investing in the maintenance of soil-conserving technology. At the start of the project it was assumed that this agro-forestry species would improve livestock nutrition. Similarly, it was assumed that the demand for milk would increase, and therefore increased production of fodder from the recommended tree would give higher milk yields and increase the household income. However, later research showed that this species had a toxic side effect: milk production increased at the expense of the reproductive capacity of the livestock. In addition, an external factor, the removal of subsidised government services (for agricultural inputs, veterinary support, and milk marketing) made milk production an unattractive commercial venture, and therefore extra fodder was no longer required. Farmers decided to remove the fodder trees and instead planted sweet potatoes and cassava on their contour bunds, increasing the risk of de-stabilisation of the bunds. Improving this situation requires a thorough understanding of the whole land management system rather than a hasty correction at the spot where the detrimental impact occurred.

Swiss Development Co-operation/Centre for Development and Environment. 1994. Impact Hypotheses: Development and its Environmental Impacts. Berne, Switzerland, 101 p.

Swiss Development Co-operation 1997. Monitoring - Keeping in touch with reality. Series of working instruments for planning, evaluation, monitoring, transference into action. Strategic Controlling Unit, Berne, Switzerland, 2 Volumes, 77 p.

Van der Burg, G. & Caldwell, R.1998. Monitoring Evaluating Reporting - MER. Management tools for development organisations. CARE International (www.kcenter.com)

Step 4 Identification and Selection of Indicator Sets

What is the role of indicators in SLM-IM?

After selecting the core issues of SLM-IM and formulating impact hypotheses for possible interventions, the next step is to define how to verify the hypotheses - the projected changes in land management compared to the present situation. Again, we face on the one hand the complexity of SLM and many different perceptions of it. On the other hand, there are practical considerations, such as the need to produce results in a short time and with limited resources. In the interest of compromise, two procedures are proposed:

(1) identify simplified representations of these complex realities, the so-called "indicators", to verify the impact hypotheses;

(2) assemble a reasonable set of indicators, since no single indicator can provide sufficient information to assess ecological, economic and social aspects of sustainability from the household level to the regional level.

Indicators are simplified representations of more complex realities

Indicators will firstly pertain to the status quo of what they represent (e.g. soil fertility, forest cover, population density). Ideally, SLM-IM starts with a baseline study prior to any project intervention as a reference for comparison with future situations. Secondly, the same indicators can be used to highlight changes (e.g. higher available nutrient content, deforestation, increasing population density), if there are at least two sets of observations. The analysis and quality of the SLM-IM improves though, if long-term observations are made. Careful comparison between project and non-project sites in the course of the project can substitute for time-series analyses to a certain extent. Thirdly, the indicators also have a normative character because they can be used to evaluate changes ("better" or "worse" than before).

Paving the way for indicator selection

Indicators are a means of communicating perceptions of sustainability among stakeholders. They are also tools for monitoring and assessing sustainability, and for predicting trends in sustainability. The type and quality of information needed for decision-making depend on the specific situation and the expectations of each project. The following list will assist you in defining which criteria are relevant for the indicator selection process in your situation.

Possible criteria for selecting indicators

Select from, modify, or complete this list of proposed criteria according to your needs:

- Validity: the set of indicators provides sufficient information about the situation to be observed.
- User-orientation: indicators are significant for different users who need the information.
- Gender-orientation: indicators are sensitive to the domains of both men and women, so that important gender-specific knowledge bases are not neglected.
- Practicability: there is a sufficient number of simple and practical indicators that are usually more effective in communicating results to and creating awareness among non-technical or non-scientific stakeholders.
- Policy relevance: there is a sufficient number of indicators that are of importance to policy makers and address environmental issues that require a political resolution.
- Sensitivity: the set contains indicators that reflect short-term, mid-term, and long-term changes in land management.
- Reliability: monitoring of indicators by different persons and at different times gives the same results.
- Timeliness: the indicators selected provide data that can be analysed and presented in time for all stakeholders who need the information.
- Compatibility: data and formats are compatible with existing data.
- Cost-effectiveness: indicator selection implies an agreeable compromise between precision of information, the time and equipment required/available, and the representativeness of data collection.
- Feasibility: required inputs (staff, funds) can be made available to monitor the indicators according to the time intervals and spatial resolution agreed upon.

see also section B1 of the Toolkit

Using a framework or model to link the indicators

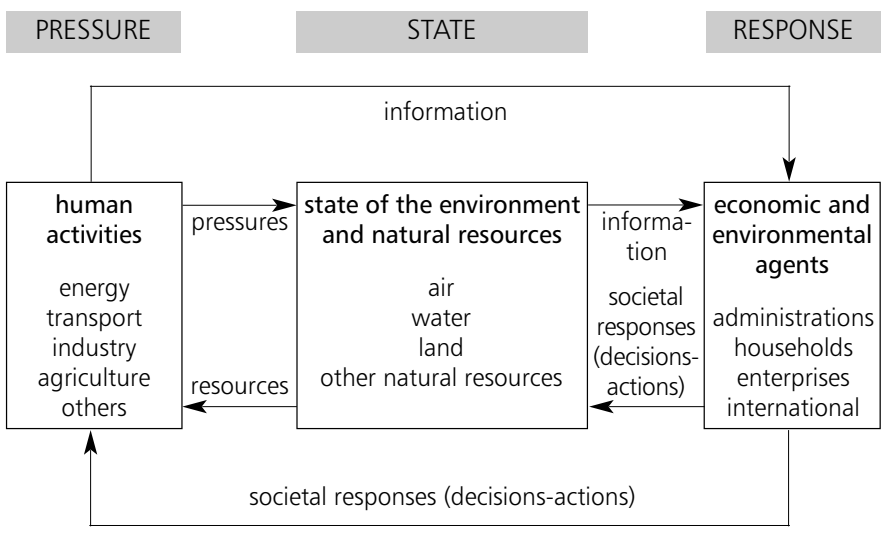
Indicators are inter-linked components and processes in one land management system, and not a group of separate variables. Although each single indicator could be interpreted independently, SLM as an entity can only be assessed if its indicators show a meaningful linkage. Therefore, a framework or structural model will be developed before selecting single indicators. For example, indicators such as "rainfall", "infiltration", "runoff" and "evaporation" are measured in the same measurement unit: millimetres (mm). Thus they can be combined in a water balance equation, which is, in effect, the quantitative framework or model linking the indicators to the hydrological issue of water balance. In the context of SLM, you will usually select different biophysical and socio-economic indicators, of both a quantitative and a qualitative nature. This heterogeneous mix requires a qualitative frame or structural model for a meaningful linkage of the indicators.

see also sections A and B2 of the Toolkit

Only a meaningful linkage of indicators leads to a sound assessment of SLM

The Pressure-State-Response Framework

The following example presents the Pressure-State-Response framework. It can be used as a structural model for identifying core issues, formulating impact hypotheses, and selecting a meaningful set of indicators. The indicators are related to the components of the model.



Indicator selection following the PSR Framework

The Sahara and Sahel Observatory identified the following topics for coverage when developing impact indicators, using the Pressure-State-Response Framework:

***Driving Forces** causing pressure on natural resources*

- *population pressure, economic growth, urbanisation*
- *policy failures/distortions (stagnant technology, delayed intensification)*
- *imperfect markets (lack of markets, poor market access)*
- *transaction costs and imperfect information (limited access to information about market opportunities)*
- *social inequity, poverty*
- *political and social instability*

Pressure indicators

- *changes in cropping techniques*
- *financial position of holdings*
- *fuelwood/charcoal consumption*
- *use of crop residues*
- *use of animal dung for fuel*
- *price of fuelwood/charcoal*
- *...*

State indicators

- *rate of deforestation*
- *rate of soil erosion*
- *degree of salinisation*
- *soil crusting and compaction*
- *crop productivity*
- *livestock productivity*
- *nutrient balance (on-farm organic matter recycling)*
- *...*

Response indicators

- *change of legislation*
- *investments*
- *tree planting*
- *state conservation programmes*
- *farmer conservation groups*
- *farmer adoption of tree planting and soil and water conservation*
- *...*

Covering all important aspects of sustainability

To insure that the indicator set covers all important aspects of SLM, the indicators can be classified, for example, according to the " 5 pillars of sustainability". The Land Quality Indicator Initiative of the World Bank (LQI) identified common (generic) and internationally agreed upon indicators for monitoring and evaluating SLM as follows:

Productivity	***Security***	***Protection***	***Viability***	***Acceptability***
• *crop yield*	• *soil cover* • *yield variability* • *climate*	• *soil quality/ quantity* • *water quality/ quantity* • *biological diversity*	• *net farm profitability* • *input use efficiency (pesticides, fertilisers, nutrients)* • *off-farm income* • *return to labour*	• *use of conservation practices* • *farm decision-making criteria*

see also chapter 1 of the SLM Module

Embedding the indicator set in a broader context

Besides the importance of an "inner" linkage of the indicator set - represented by a structural model - there is also a wider - "outer" - context to be taken into consideration:

- The **temporal** point of view: using existing data bases (generated by the project, other agencies, etc.) saves time and costs, if your choice of indicators, type of data, format, and frequency of reporting can be made compatible. If so, this would "extend" your own monitoring period and your initial monitoring would already indicate a trend in land management. Secondary data can consist of activity and evaluation reports of institutions and organisations, information held by key persons, statistics, a census, or other monitoring systems. For example, if you are in need of rainfall data, the data base of a meteorological service can extend your information base by many decades!
- The **spatial** point of view: the indicator set must reflect the fact that a project impact is not necessarily restricted to the project area (on-site impact), but may reach much further (off-site impact). For example, where terraces are applied (on-site), they affect the amount of water, soil and nutrients that leave the watershed. Thus people living downstream (off-site) are also affected by these technologies. The selection of representative monitoring locations will help reduce the costs of on-site and off-site SLM-IM.
- The **hierarchical** point of view: local indicators are site-specific, which might limit the aggregation of information at national or international level. Nonetheless, when selecting local indicators, consideration should be given to whether and how they can possibly be aggregated to become an even more useful tool for decision- and policy-making. For example, a local indicator such as the colour of plant leaves can be calibrated with generic soil fertility indicators such as nutrient deficiency, which can be costed. In this case, these indicators are useful for calculating the relevance of resource degradation for a national economy.

The impact of a project is not restricted to the project area

Indicators of SLM

The literature in the field provides a wealth of information on "indicators", but no common classification. Instead there are different ways of perceiving, grouping or categorising SLM Indicators:

Generic (external) indicators are based on international agreements reached by "external" stakeholders such as project staff, researchers or policy makers. **Local (indigenous, site-specific)** indicators are mainly used by local ("internal") stakeholders and vary from place to place. The latter are often **hidden (crypto-)** indicators, which means they may not appear to "external" stakeholders to have a clear relation to issues under study. For local stakeholders, however, they portray the most significant changes in the system (e.g. replacement of cattle by goats in areas with degrading rangeland).

Linking generic and local indicators

Generic (external) indicator	*Local (indigenous) indicator*
higher level of nutrients and organic matter, leading to higher crop yields	*a locally specific plant species*

For a common understanding among stakeholders, it is important to determine potential interactions or links between the local and the generic indicators that basically represent the same aspect: Are the local indicators valid only for specific times, environmental conditions, and social groups? How and when are the indicators used? Are there any possible long-term relationships associated with the indicators? In this example, long-term indicators include the environmental conditions and succession processes that must exist for a specific plant species, the way these conditions are related to current land use practices, and the implications for maintaining soil fertility in the area.

A **measurement** (often **scientific**) indicator contains quantitative information based on precise and replicable measurements. **Proxy** or **surrogate** indicators have a more indirect relation to the issue. They may be quantitative and qualitative. **Experiential (anecdotal)** indicators contain qualitative and semi-quantitative information based on experiences and people's perceptions and attitudes. In general, measurement indicators emphasise objects and often show short-term impacts, whereas experiential indicators emphasise subjective views and frequently reflect long-term changes.

Measurement, surrogate and experiential indicators

Important SLM issue	*Experiental indicators*	*Surrogate (proxy) indicators*	*Measurement indicators*
soil fertility	• *topsoil colour and texture* • *no. of bags of produce harvested from a field* • *symptoms of poor growth in crops and weed species* • *colour of stream*	• *species and diversity of plants on fallow land* • *pest levels in the field* • *amount of stream siltation*	• *soil nutrient content* • *crop yield*
Health and nutrition	• *appearance of children (stunting, hair loss, etc.)*	• *family income level* • *crop production level*	• *growth rate of children* • *protein and vitamin levels in the body*
Household income	• *type of clothing* • *ability to pay off loans*	• *number and quality of household items*	• *net returns on investment* • *off-farm income of each family member*

see also section B3 of the Toolkit

An alternative categorisation distinguishes **strategic** and **cumulative** indicators. Strategic indicators show a direct cause-effect relationship where one statement or recommendation will be made for each indicator (e.g. crop yield indicating soil fertility). The cause-effect relationship with cumulative indicators is not necessarily direct, and several indicators will be required for each statement or recommendation (e.g. soil organic matter, available N, P, K; CEC indicating soil fertility).

How to start - Guiding questions for indicator selection

Guiding assessment questions for the development of indicators on a community basis could be modelled on those formulated by IUCN

- How are you doing, how is the ecosystem doing?
- What needs to be done?
- How would you know if things were getting better or worse?
- Where would you get such information?
- Who has the information?
- What would you need to look at in order to find out?
- What would you need to count in order to measure or find out?

Preparing assessment and information management

Whatever "model" and set of indicators you choose, it will later be the basis for analysing the data and assessing the degree of sustainability during Step 6 of SLM-IM. Later disagreement between stakeholders is inevitable if the criteria for assessment are not debated during the SLM-IM step of indicator selection. In the debate among stakeholders, prior agreement should be reached on:

(1) definitions, target and threshold values for single indicators:
At what level are we now? What level do we want to achieve? Such evaluations depend on the perception of the stakeholders and can be both quantitative ratings (numeric values) and qualitative ratings (very good, satisfactory, indifferent, unsatisfactory, very bad). Both systems can also be "calibrated" to each other if necessary.

(2) an overall SLM assessment scheme:
How can the indicators be evaluated in combination? What weight or importance will be given to each indicator in relation to the others? Which indicators reflect ecological, economic and social aspects of sustainability? Which aspects are not yet at a satisfactory level and need to be further improved, and how?

see also SLM-IM Step 6

Define the assessment criteria now to avoid conflicting interpretations later

As stakeholders will interpret monitoring results differently, their different needs regarding information management are also best discussed during indicator selection. Who requires what form of output or reporting? How should the results be presented to different stakeholders? Where and how would different stakeholders prefer to have the information stored?

see also SLM-IM Step 7

Incompatible interpretation

The incidence of rural poverty in India offers an example of cross-validation in SLM-IM. Household incomes declined for 20 years. This quantitative measurement indicator may have led researchers or policy makers to the conclusion that general development was moving away from sustainability. However, poor people's interpretation of the trend was rather positive. For them, qualitative and experiential indicators such as mobility and independence were more important. They felt that the conditions of their lives were more sustainable because they were more mobile and less dependent on the village elite. Such conflicting judgements and misunderstandings will eventually be counterproductive and destroy development efforts.

Bellows, B. (Ed.) 1995. Proceedings of the indicators of sustainability conference and workshop. August 1-5, 1994 Arlington VA. SANREM CRSP Research Report 1-95, 312 p.

Bellows, B. 1996. Indicators of sustainability. Workbook for the SANREM CRSP. Washington State University/University of Wisconsin, USA.

CIMMYT. 1993. La adopción de tecnologías agrícolas: guía para el diseño de encuestas. Mexico.

Dumanski, J. 1997. Criteria and indicators for land quality and sustainable land management. Paper presented at the SLM Workshop, Enschede, The Netherlands.

CIAT 1997 a. Indicadores locales de la calidad del suelo. By Charlotte Gaye Burpee and Willmer R. Turcios. Tegucigalpa.

CIAT 1997 b. Cuadro de indicadores de la calidad de suelo. Tegucigalpa.

CIDA. 1996. Guide to gender sensitive indicators. CIDA, Ottawa, Canada.

CIDA. 1996. The why and how of gender sensitive indicators: A project level handbook. CIDA, Ottawa, Canada.

Defoer, T., De Groote, H., Hilhorst, T., Kanté, S., Budelman, A. forthcoming. Farmer participatory research and quantitative analysis - a fruitful marriage? Journal of Agriculture, Ecosystems and Environment.

Dumanski, J., Gameda, S, & Pieri, C. 1997. Indicators of land quality and sustainable land management. Annotated bibliography. The World Bank, Agriculture and Agri-Food Canada. 157 pp.

Eswaran, H., Sloger, C. 1997. Considerations on indicators for sustainable land management

Holden, S., Shiferaw, B., Wik, M. 1996. Importance of poverty, credit constraints, and time preferences of relevance for environmental policy. Discussion paper No. D-26/1997, Agric. Univ. of Norway, Dept. of econ. and soc. sciences.

IUCN 1997. (World Conservation Union). An approach to assessing progress towards sustainability - tools and training series. IUCN/IDRC, Gland, Switzerland: Lee-Smith, D. Community based indicators.

INSAH, 1997. Cadre méthodologique provisoire de suivi-impact en gestion des ressources natureles/systèmes de production; document prepared for the OSS workshop on impact indicators in June 1997

Lal, Rattan 1994. Methods and guidelines for assessing sustainable use of soil and water resources in the tropics. SMSS Technical Monograph No. 21. Columbus OH, USA, 78 p.

Maitre, A. & Kuan, E. 1997. La experiencia de PASOLAC con la metodología de la evaluación participativa por beneficiarios en la medición de la adopción de prácticas de conservación de suelos y agua. In: PASOLAC. PRM. PROFRIJOL. Memoria del Taller de estudios de adopción. Managua.

Müller, S. 1996. How to measure sustainability: A proposal for the agricultural and natural resources sector. Discussion Paper Series on Sustainable Agriculture and Natural Resources No. 1. Inter-American Institute for Co-operation in Agriculture (IICA) and German Agency for Technical Co-operation (GTZ), GTZ, Eschborn, Germany, pp. 36-55.

OECD. 1997. Environmental indicators for agriculture. OECD, Paris, France, 62 p.

PASOLAC. 1996 a. Evaluación Participativa por Beneficiarios, 1996. Managua.

PASOLAC. 1996 b. Sistematización de la metodología de la evaluación participativa por beneficiarios, 1996. Managua.

Sahara and Sahel Observatory 1997 a. Implementation and impact indicators for the convention to combat desertification. 34pp.

Sahara and Sahel Observatory 1997 b. Impact indicators and monitoring-evaluation for action programmes to combat desertification. 27pp.

Pieri, C., Dumanski, J., Hamblin, A. and Young, A. 1996. Land quality indicators. World Bank Discussion Paper No. 315, World Bank, Washington DC, USA.

Saín, G. & Barreto, H. 1996. The adoption of soil conservation technology in El Salvador: Linking productivity and conservation. In: Journal of Soil and Water Conservation, 51(4): 313-321.

Smyth, A.J. and Dumanski, J. 1993. FESLM: An international framework for evaluating SLM. World Soil Resources Report No. 73, FAO, Rome, Italy.

Templeton, S., Scherr, S. (forthcoming). Population pressure and the microeconomy of land management in hills and mountains of developing countries.

Traeger, H. 1997. Indicators of sustainable land management. A literature review. GTZ, Eschborn, Germany.

Trzyna, T.C. 1995. A sustainable world. Defining and measuring sustainable development. International Centre for the Environment and Public Policy, California Institute of Public Affairs, Sacramento/Claremont, USA. 272 p.

Ulloa, S. et al. 1997. Adopción de Tecnologías de Conservación de Suelos y Agua en Cinco Pinos y El Chaparral (Chinandega). SGJRL. Managua.

Van der Burg, G. & Caldwell, R.1998. Monitoring Evaluating Reporting - MER. Management tools for development organisations. CARE International (www.kcenter.com)

Van Niewskoop, M. et al. 1994. La adopción de las tecnologías de labranza de conservación en La Fraylesca, Chiapas. CIMMYT. INIFAP. Mexico.

Zweifel, H. 1998. The realities of gender in sustainable land management. Inputs for reflection and action. Development and Environment Reports, No. 16. CDE, Berne.

Step 5 Selection and Development of SLM-IM Methods

Considering existing monitoring procedures

If you have come across existing monitoring systems during SLM-IM Step 4, your decision on indicators and methods for SLM-IM may have been anticipated to a large extent. Using existing systems makes it possible to deal with common perceptions of SLM, to reduce the costs of monitoring, and to make SLM-IM a standard activity of local organisations. Unless existing monitoring methods are entirely unsuitable for your project and its stakeholders, it is advisable to continue with previously applied methods. But what do you do if monitoring experience is not available, or the methods used are too sophisticated for the project's purpose? In this case, appropriate SLM-IM methods must be selected or developed, in line with the indicators that were chosen earlier.

Wherever possible, continue with existing monitoring methods

The nature of monitoring methods

These Guidelines distinguish two basic groups of methods, trans-sectoral and sectoral.

(1) Trans-sectoral methods make it possible to monitor a variety of indicators using the same tool. For example, informal interviews provide information on both socio-economic and biophysical indicators. Trans-sectoral methods are included in a methodological set such as Participatory Rural Appraisal (PRA) or Participatory Learning and Action (PLA).

(2) Sectoral methods usually monitor single indicators, particularly of a biophysical nature. Many sectoral methods are scientific and quite sophisticated. This may be because cost-effective "rough" methods are rarely developed by researchers who need a more sophisticated methodology. Practitioners, by contrast, may have developed a number of practical methods but rarely document or publish them.

see also section C of the Toolkit (C1 and C2)

These Guidelines are an attempt to bridge this gap and present practical and cost-effective methods. The Toolkit contains an initial selection of such methods as well as criteria for a brief methodological protocol. It would require further effort to supplement this selection, on the one hand, calling upon researchers to give more emphasis to practical methods. On the other hand, it is also suggested that project staff develop their own monitoring methods and use the proposed protocol criteria to document their own methodological experience.

see also section C of the Toolkit

Criteria for selecting and developing SLM-IM methods

Selection of the appropriate method will depend on the objectives of SLM-IM and requires some clarification in advance: what is expected from the data collected? Is it sufficient to get qualitative results or is there a need for quantitative information? The following list of criteria provides assistance in what to think about when selecting methods. Note that questions like "Do you need a rough or accurate method?" do not suggest that there are only two extremes. Often a complementary mix of both is recommendable, and certainly there is also a range of choices in between. Polarisation is merely an attempt to guide your thinking about several aspects that may otherwise be forgotten.

- Data accuracy: in order to meet the agreed objectives of SLM-IM, do you need on-station experimentation or on-farm monitoring, elaborate or quick observation, accurate or rough methods?
- Potentials/limitations: does careful evaluation of the pros and cons of each method show that they are in line with or conflicting with the objectives and expectations of SLM-IM?
- Investments required: are labour requirements, knowledge and skills, equipment, materials, and supervision in line with the project resources available, and with the resources of those who will implement a post-project SLM-IM?
- Requisites for implementation: what expert advice, facilities such as laboratories and data bases, logistics such as transport and computers, and attitudes of the participants implementing the method are available or can be organised, possibly with other projects in a similar situation?
- Application level: on which hierarchical levels, such as plot/household, village/watershed, or district will SLM-IM take place?
- Area coverage: do you need studies with great area coverage (aerial surveys), or detailed in-depth studies covering a few representative locations?
- Frequency of SLM-IM: can the costs of an increasing number of observations over time be covered or must the number observations be reduced?
- Feedback: in view of the necessity to provide quick feedback to stakeholders, does the project have the facilities for quick data collection, immediate analysis, and presentation of the results?

Qualitative and quantitative methods

What data quality will eventually be expected for which indicator or result? Any SLM-IM starts with a qualitative survey to get an overview of the land management system. In general, a **qualitative** method allows a more flexible design for SLM-IM. For example, it can incorporate local indicators and stakeholders' perceptions much more easily than a quantitative method. Qualitative methods are used when:

- a broad understanding of several dimensions of a problem is adequate;
- people's perceptions, attitudes and priorities are to be explored;
- time and money are short, or a rapid assessment of the problem is required.

A qualitative survey and assessment makes clear

- where a more comprehensive understanding of the facets of a problem is adequate;
- where sectoral and highly accurate information is needed (statistical evidence and hard data);
- where the problem needs to be investigated and understood in great detail.

This usually implies the need for quantitative methods. A **quantitative** method provides numerical data, and it requires a more rigid monitoring structure, more time, more sophisticated equipment, well-trained and often high-level personnel. Data collection must be closely supervised. The requirement for statistical proof or significance should be defined during the stage of indicator selection, because considerable amounts of high-quality data are needed to apply statistical analysis.

If statistics are applied on the basis of data of poor quality, the interpretation will not be reliable. Therefore, a statistician should be consulted when defining core issues and selecting indicators, and prior to selection of the corresponding SLM-IM methods.

SLM-IM incorporates a complementary selection of qualitative and quantitative methods

Developing your own methods

There are plenty of opportunities to create and incrementally improve your own monitoring methods, particularly if you are in need of qualitative or semi-quantitative information. Already during the identification phase of a project, ideas about how to observe and measure various parameters will come up: while holding informal discussions with local land users and other stakeholders, walking through the project area, or mapping phenomena related to land management, etc. In collaboration with experienced researchers, you may be able to improve the documentation or even the quantification of such observations and develop a tailor-made cost-effective and sound SLM-IM system.

see also section C1 of the Toolkit

Develop and thoroughly document your own methodological field experience

Low-cost monitoring of soil and water conservation measures: The "kite method"

The major objective of the Rural Development Project in Tahoua, Niger is protection and sustainable management of natural resources to improve the livelihood conditions of the population. The project approach is based on participatory land use planning. Due to the long dry season and heavy but insufficient rainfall (392 mm mean annual rainfall) during the rainy season, soil and water conservation (SWC) measures are a major component of the project activities. In order to monitor progress in implementation of SWC techniques like "demi-lune", and to measure their impact on biomass and millet production, the "kite method" was developed by GTZ, MAE in co-operation with the University of Hohenheim, Germany:

A camera is attached to a kite and photos of the SWC sites are taken from 300 m above the ground at regular intervals (before and during the vegetation period). Thus the biomass development and soil rehabilitation can easily be monitored over a period of several years by comparing photographs. The method is a low-cost alternative to conventional aerial photography and allows more detailed monitoring of small plots.

GTZ, MAE, 1997. Gestion durable des ressources naturelles:leçons tirées du savoir des paysans de l'Adar. Eschborn

Hinchcliffe, F., Guijt, I., Pretty, J.N., Shah, P. 1995. New horizons: The economic, social and environmental impacts of participatory watershed development. IIED Gatekeeper Series No. 50, IIED, London, UK, 22 p.

IIED PLA Notes - Notes on Participatory Learning and Action. IIED, London, UK.

Pretty, J., Guijt, I., Thompson, J. & Scoones, I. 1995. A trainer's guide for participatory learning and action. IIED participatory methodology series, London, UK, 267 p.

Step 6 Data Analysis and Assessment of SLM

The objectives, indicators and methods selected for SLM-IM determine the type of analysis. It is not possible to cover all topics in data analysis within these Guidelines. Instead, emphasis is given to general considerations and recommendations.

When to carry out SLM impact analysis

SIM Impact analysis is done at any time during and after an intervention. The purpose of analysis, however, may vary as follows. From a project's point of view, during the life-time of a project, as in the case of a mid-term review, the purpose of the analysis is to determine if project activities resulted or will result in the intended impact and contribute to SLM. At this stage, a time series of data may be short or incomplete and thus not finally conclusive. Consequently, the analysis will only show the general trend in the context of the desired impacts, but it provides valuable information for corrections or adjustments of project activities. At the end of a project, the purpose of impact analysis is to learn what worked and what did not, and to make recommendations for future activities. Later, an overall analysis of similar projects can also help to improve government and donor policies.

SLM impact analysis is trend analysis that provides information for strategic adjustment of plans

Analytical approach

The analytical approach reflects the "model" you have chosen earlier (cf. SLM-IM Steps 2 to 4), in which the indicators - and consequently the results of their monitoring - are inter-linked. The approach consists of:

(1) a preparatory phase, when each indicator is analysed separately in light of its own agreed targets.

(2) the main phase of analysis and assessment, with an aggregation of all indicator values or judgements in an overall scoring (rating) system, where the indicators are analysed in light of their contribution to SLM and to verify the impact hypotheses.

Data exploration and analysis

Qualitative exploration and analysis

Analysis of qualitative data is more complicated than quantitative analysis because it involves data with a different level of accuracy. A semi-quantitative analysis - converting qualitative information into a rating or scoring system - may process qualitative data more satisfactorily. One way of doing such an analysis is to categorise or classify data according to a defined scale referring to the desired situation. The procedure for this method is described below.

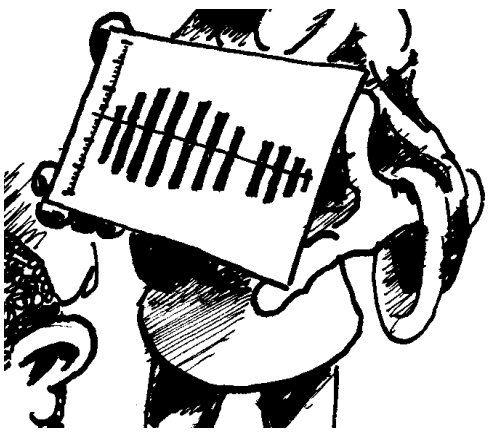
Procedure for analysing qualitative data

As qualitative data are sometimes difficult to classify or lump together, transforming these data into a semi-quantitative format may facilitate the analysis. Such a transformation, and the subsequent analysis, consist of the following procedures:

1) Invite stakeholders to assess the status quo of each topic (e.g. soil erosion has been reduced, which is considered positive).
2) Group similar topical assessments into categories, each concerned with a certain issue (e.g. reduced soil erosion, increased biodiversity and improved water quality can be grouped as "minimised resource degradation").
3) Within each issue, arrange the topical assessments according to how closely they approach the desired situation (e.g. was the reduction in soil erosion sufficient to meet the expected or desired target?).
4) Use the defined critical values for each issue in order to divide topical assessments among three or more classes (e.g. from 1 = highly unsatisfactory to 5 = highly satisfactory).
5) Verify whether the topical assessments are put into the correct classes.
6) Present the results in tables or diagrams. This allows a more general assessment (several topics) for different periods or locations.

Rating, quantitatively or qualitatively, with numerical weighting schemes is a common tool for aggregating indicator values. Rating is the transformation of indicator values into uniform values so that they can be compared or used for calculation. The rating must now reflect what you decided during SLM-IM Step 4: whether each indicator is considered equally important in the framework or model of SLM, or whether some are considered more important than others, implying that they have been given a different weight according to their estimated importance.

For a general assessment with the participation of all stakeholders, it may be helpful to engage a facilitator to assist the participants.



Aggregating indicator values by rating

The performances of different soil indicators (topics) will be assessed in view of their limitations with regard to SLM. For each indicator 5 limitation classes are defined from 1 = lowest limitation to 5 = highest limitation. Each indicator's performance is then related to a certain class. Finally, the aim is to assess all soil indicators in one cumulative rating index that represents the entire soil component, e.g. in the framework of SLM. 5 assessment classes are also created for the cumulative rating index, from highly sustainable to unsustainable, and the index is judged accordingly. Within this example, all indicators have been found to be of equal importance or weight.

soil indicator	***limitation class***
rooting depth	*3*
acidity	*5*
Al toxicity	*4*
available water capacity	*2*
texture	*1*
bulk density	*2*
nutrient status	*5*
soil organic carbon	*3*
percent aggregation	*1*
soil erosion	*3*
cumulative rating index	***29***

cumulative rating index	***assessment of cumulative rating***
<20	*highly sustainable*
20-25	*sustainable*
25-30	*sustainable with high input*
30-40	*sustainable with another land use*
>40	*unsustainable*

Quantitative exploration and analysis

If quantitative data and analysis are required, consult professionals during indicator selection.

Suggestions for carrying out a first quantitative exploration and analysis are presented below. By analysing the data supplied by individual indicators and interpreting the results, it is possible to signal positive and negative trends and changes in indicators, and where changes differ from the expected outcomes. Depending on the accuracy of the method, results imply uncertainty. In other words, the trends are often not as clear as the data seem to indicate. This should be taken into consideration before crucial decisions - which may affect the livelihood of people - are based on the interpretation of results! The quantitative data collected with this kind of monitoring often do not justify a statistical analysis, as these data are often not normally distributed and perhaps were not obtained through random sampling.

see also section D of the Toolkit

Hints for semi-quantitative data analysis

For exploratory analysis:

- arrange data individually or grouped in distribution classes according to the magnitude of the value of the variable, and calculate standard measures such as range, minimum and maximum, arithmetic mean or median, standard deviation;
- draw graphs to facilitate detection of possible patterns and identification of outliers and data distributions that may suggest additional lines of analysis;
- decide upon criteria for trimming data (outliers) beforehand;
- consider transformation of data:
  - convert to percentages;
  - convert to indices, such as removing the mean from all data and dividing the result by the mean; this enables the comparison of two data sets with different means;
  - convert to standardised normal deviates, which measure the variability of the data set.

Statistically, environmental data are often not normally distributed and the sample size is small. In this case, not all standard measures can be used!

Assessment

With little training and support, representatives of all stakeholder groups will be able to actively participate in exploration and analysis. During the discussions various opinions and different interests are likely to arise. The project may not resolve these differences, but it may facilitate an exchange of viewpoints and, if invited, mediate or provide suggestions for resolving conflicts.

The process of analysis is not predetermined but guided by the stakeholders

What is the impact of an intervention on SLM, and what needs to be done from now on? These are the key questions to be finally answered through SLM-IM. In accordance with the analytical approach mentioned earlier, this will be done in two phases.

Preparatory phase

Each indicator is separately seen in light of its contribution to SLM. During SLM-IM Step 4, the stakeholders agreed on the evaluation criteria to judge the performance of each separate indicator. Such conditional assessment (conditional rating) is used to determine whether all objectives are met, some objectives are temporarily not met, or some objectives are not met. Separate analysis is only preparatory in view of phase (2) of analysis and assessment, when assessment and debate about why targets were met or not met also take place. A huge number of indicators may suggest that individual indicators are combined in meaningful categories and assessed by category. This is done using the same rating procedure described earlier.

see also the examples in SLM-IM Step 4 and the Toolkit, section D

Analysis and assessment of indicators by category

The impacts of project activities on SLM can be divided into logical categories, for example, to summarise the bio-physical, the socio-economic and the policy-relevant impacts:

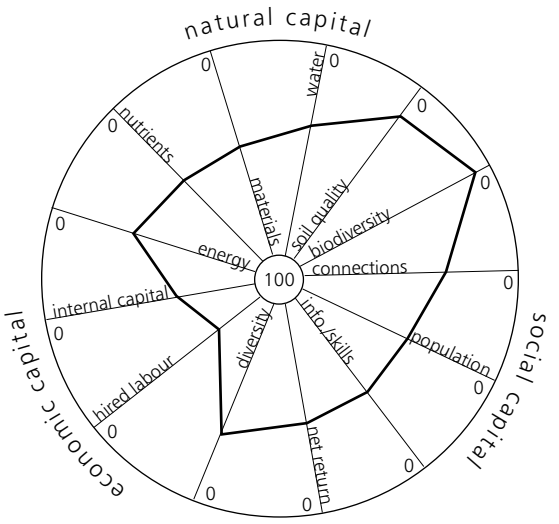
- *A positively assessed biophysical impact shows how activities contributed to SLM - for instance by reducing resource degradation - and ideally provides information about cause-effect-relations or inter-linkages and who and what contributed to the impact (land users, NGOs, government, agribusiness). If the biophysical impact is assessed negatively, it may provide conclusions about what practices are to be changed or how project activities would contribute to more sustainable land management. The impact can also be estimated from response indicators such as the reaction of land users, their participation in project activities, the rate of adoption of new technologies, and the adaptations they made in proposed technologies.*
- *The socio-economic impact will include income level and distribution, return to labour, access to basic services, and food security. Positive impacts, e.g. viable SLM technologies or a high adoption rate, may also suggest a good project performance, if they have not been manipulated through careless use of incentives and subsidies.*
- *The policy-relevant impact combines indicators that stress the effect of policies on SLM and indicates what kind of policies are to be prioritised or changed, e.g. land tenure, user rights, market policy, use of subsidies, etc.*

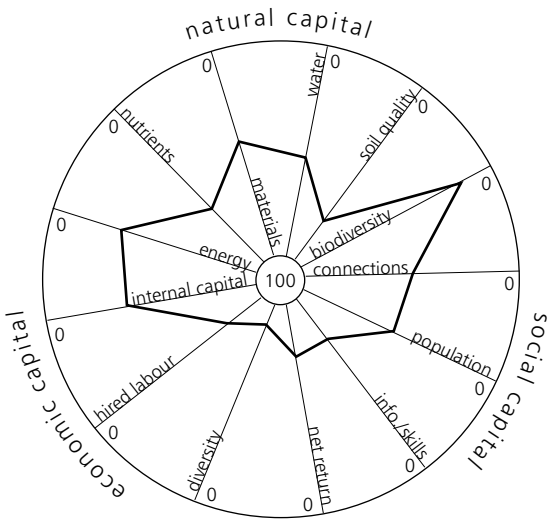
Main phase

The overall analysis involves all indicators or indicator categories to verify the impact hypotheses and to detect a general trend in SLM. For this phase the weight of each indicator within the framework or model is important, as agreed upon during Step 4. Overall analysis and assessment requires judgement, because the relative value given to each indicator, category of indicators, aspect or pillar, is subjective. It reflects the expectations, wishes and aspirations of the stakeholders in view of the outcomes. The results of any periodic SLM-IM therefore deserve new discussion and negotiation among the stakeholders.

Index of sustainability - Sustainability polygons

The sustainability index can be used to compare two or more representative monitoring sites, such as farms, communities or watersheds. The indicators selected are arranged in the form of a wheel. Beforehand, the stakeholders define how to rank each indicator from 0 (=lowest sustainability level) to 100 (highest sustainability level). On each of the wheel's spokes, the rank of the indicator is marked and all marks are then connected. Assessing the polygons of single sites shows where there is a deficit area that needs further attention and corrective action. Comparing the polygons of two or more sites reveals sites from which others can possibly learn. The same method used for several months or years will indicate whether or not corrective action fulfilled its purpose and led to more sustainable land management.





Unsustainability or conditional sustainability?

In final assessment of the overall sustainability of land management, sustainability requirements of some dimensions, aspects or pillars may be met, while others may not. Sustainability appears to be conditional. For example, corrective measures may have led to satisfactory protection of land resources. In this respect, satisfactory means that the target value defined by the stakeholders was met (reduced soil loss per year, crop production level maintained, drinking water quality improved, etc.). However, the measures may have involved unexpected costs which cannot be covered by the land users, and therefore target values attached to the costs of protective measures were not met. Apparently, biophysical indicators suggest that the quality of the resource base is being enhanced, while socio-economic indicators simultaneously suggest that the quality of life is perceptibly decreased. In this case, the farming system could be rated as "unsustainable because of low viability of the corrective measures" or it could be rated "conditionally sustainable pending a correction of the viability".

A step towards more sustainable land management is made only if all targets are satisfactorily met

Conditional sustainability requires further debate and investigation of the indicators whose target values were not reached and the reasons why, the probability of reaching the target in future, and options for improvement. It is interesting to see which stakeholders come to the conclusion that land management is more sustainable than before, and how different project areas developed in relation to each other. Contradictory indications require a participatory assessment to weigh their relative importance. Solutions can only evolve from the stakeholders' discussion. When assessing conditional or overall sustainability, the following classification can be of help. It may need adaptation to local conditions, but it encourages stakeholders to include the temporal aspect and it is a reminder that land management systems are subject to constant change.

Sustainability classification

	class	**confidence limits**
sustainable	1 sustainable in the long term	25 years or more
	2 sustainable in the medium term	15-25 years
	3 sustainable in the short term	7-15 years
unsustainable	4 slightly unstable	5-7 years
	5 moderately unstable	2-5 years
	6 highly unstable	less than 2 years

Corrective action

Corrective actions or decisions are usually connected with indicators that did not meet the targets, and debate will focus on which activities to change and how. Also, unintended consequences call for more concern in the next phase of a project. Identifying unsatisfactory results and unintended consequences requires further investigation. Since they may be symptoms rather than causes of "what is wrong", it would be too simple to mechanically apply corrective action at these points only. SLM is a complex system and manipulating one element will also affect the others. During the course of project implementation, unintended consequences often come to light through dialogue between project team members and other stakeholders. Again, only a debate among all stakeholders provides a certain security that important consequences will not be forgotten while determining corrective actions. The debate will eventually lead to participatory confirming or redefining of project activities to obtain better results in the future.

Corrective action requires more than repairing an error

Casley, D.J. & Kumar, K. 1985. The collection, analysis and use of Monitoring and Evaluation data. John Hopkins University Press, Baltimore, USA.

Dalsgaard, J.P.T., Lightfoot, C. and Christensen, V. 1995. Towards quantification of ecological sustainability in farming systems analysis. Ecological Engineering 4, pp. 181-189.

Dumanski, J. (forthcoming). Guidelines for conducting case studies under the international framework for evaluation of sustainable land management.

Francis, C., Aschmann, S., Olson, R. 1997. Indicators of functional sustainability of farms and watersheds. Proceedings of the conference on "Investigating Ecosystem Dynamics at the Watershed Scale". SWC Society, Athens, GA, USA.

Gomez, A.A., Swete Kelly, D.E., Syers, J.K. and Coughlan, K.J. 1996. Measuring sustainability of agricultural systems at the farm level. In: Methods for assessing soil quality, SSSA Special Publication No. 49, Soil Science Society of America, Madison, USA, pp. 401-409.

IUCN International Assessment Team. 1995. Assessing progress towards sustainability: A new approach. In: Trzyna, T.C. (Ed). A sustainable world. Defining and measuring sustainable development. International Centre for the Environment and Public Policy, California Institute of Public Affairs, Sacramento/Claremont, USA, pp. 152-172.

International working group for the FESLM, 1995. Guidelines for conducting case studies under the international framework for evaluation of sustainable land management (FESLM). ISSS. (unpublished).

Kwan-Kai-Hong, P., Lecomte, B. & Pierret, M.-H. 1996. Cinq outils pour l'auto-evaluation. Service d'évaluation DDC, Berne, Switzerland and Edition GRAD, Bonneville, France.

Lal, R. 1994. Methods and guidelines for assessing sustainable use of soil and water resources in the tropics. Dept. of Agronomy, Ohio State Univ.. Columbus,78 pp.

Marks, M.K. 1996. Monitoring and evaluation toolkit. International resources group. Contract No.624-0265-C-00-3026; Project No. 683-0265. Washington D.C. 171 pp.

Smyth, A.J. and Dumanski, J. 1993. FESLM: An international framework for evaluating SLM. World Soil Resources Report No. 73, FAO, Rome, Italy.

Swiss Development Co-operation 1997. Monitoring - keeping in touch with reality. Series of working instruments for planning, evaluation, monitoring, transference into action. Strategic Controlling Unit, Berne, Switzerland, 2 Volumes, 77 p.

Van der Burg, G. & Caldwell, R.1998. Monitoring Evaluating Reporting - MER. Management tools for development organisations. CARE International (www.kcenter.com)

Zweifel, H. 1998. The realities of gender in sustainable land management. Inputs for reflection and action. Development and Environment Reports, No. 16. CDE, Berne.

Step 7 Information Management

The results of the SLM-IM procedure - the overall assessment as well as detailed information - are valuable for different user groups. However, each user group has its own interests and its own role to play in SLM. Consequently, different user groups require different types of information to be stored and presented, using a language and a means that meet its needs.

Address different users in ways appropriate to their respective needs

User-oriented output presentation and dissemination

Eventually, findings are summarised and presented to all stakeholders in order to get their reactions. If necessary, these reactions will guide further stages of analysis. A common practice for documenting SLM-IM results - particularly in development co-operation - is to write a report. However, a report may be of great value for some, but by no means sufficient for all stakeholders. Many participants are thus excluded from general debate and communication. Which format and output is appropriate for which stakeholder group?

Defining users of SLM-IM information and their requirements

Modify and complete the following examples according to your own situation:

selected stakeholders

	land users	*provincial and national authorities*	*international, multilateral agencies*
their role in SLM	application of SLM-enhancing practices, ...	priority setting of areas to be supported by the government, dissemination of research findings, ...	identification of and investment in new development programmes, ...
type of information needed	technical, economic, and policy, ...	policy issues, planning and administrative issues, ...	aggregated and strategic information, ...
use of information	for improving farm economics, crop production, ...	to predict trends and changes in resource degradation, to mediate in conflict management, ...	strategy development for project selection, optimise investments, ...
means of storage	graphs, filing cards, ...	reports, digital data base, ...	reports, meta-data-base, ...
means of dissemination/ presentation	discussion platform, leaflets, ...	reports, workshops, planning sessions, leaflets, ...	reports, Internet, ...
language of communication	local language, technical and common terminology, ...	local and national language, administrative and scientific terminology, ...	English, French, Spanish, economic and scientific terminology, ...

The following points may help to establish user-friendly information management. Is the information relevant to the users' situation and perceived problems? Is it practical and credible from the users' point of view? Does the presentation meet users' expectations, is it understandable, and does it invite comments and discussion? As a rule of thumb:

- First, visualise SLM-IM results using tables, cross tables, line graphs, histograms, bar-, pie-, flow- and organisational charts, maps and overlays. There are various means for disseminating SLM-IM information, such as a full report, a summary report, a newsletter, pictures/slides/videos, workshops, posters, puppet shows, theatre, etc. Visualisation will minimise the danger that M&E specialists are blinding other stakeholders with fancy data and statistics.
- Second, a presentation of results soon after the SLM-IM keeps the stakeholders informed and involved in SLM-IM. It allows them to analyse and reflect on the situation immediately. Moreover, it certainly will evoke their reactions, which makes it possible to verify information gathered and to perceive impacts in another way.
- Third, it is motivating to have regular gatherings to present and discuss the development of SLM over time, highlighting the changes in indicators.

Delayed data analysis

Common interest in data may be lost if they are not analysed as they are obtained and immediately communicated to all stakeholders.

Practical hints for …

... writing the SLM-IM report

- keep it short and clear
- use subheadings
- emphasise key points
- use short sentences
- plan spacing and layout (one idea per paragraph)
- use a running commentary
- use listings and checklists
- avoid long footnotes
- submit it on time

... presenting SLM-IM output

- report only the information that is needed
- highlight and start with the important points
- ensure an attractive, evocative way of presenting the outputs
- relate the information to necessary actions or decisions, and state implications in if-then terms
- present both positive and negative experiences (the latter stresses what the project should do differently in future instead of talking about "failures")!

Storage of information

Monitoring the impact of development activities on SLM implies taking a long-term perspective in land management. Only the proper storage of data guarantees appropriate assessment of changes, and only permanent access to information ensures stakeholders' interest. Establishing a well-thought-out storage system raises some crucial questions: what, where and how should information be stored?

see also Step 7 of this module

Users' needs determine what, where, and how to store SLM-IM information

What to store

Initially, there may be uncertainty about what information is really needed, and a tendency to collect more data than necessary. To avoid a data cemetery which contains a load of unused or unusable information, storage should be restricted to information that is essential and relevant to the users involved. Appropriate selection may not be possible right from the beginning of the SLM-IM procedure. But after a prolonged period of SLM-IM, when more data are collected, analysed, and jointly assessed, it becomes possible to segregate essential information from less important information. For those who are actively involved in the SLM-IM, it is most relevant to thoroughly document the details of the SLM-IM procedure. This is particularly necessary because participants change during the SLM-IM period, and their successors may not have been involved from the beginning.

Beware of data cemeteries

At the beginning of a monitoring procedure, one tends to collect as much data as possible (according to the motto: "you never know what we may need it for"). However, the result is often a huge quantity of data, a so-called "data cemetery", impossible to process, administer, analyse or publish, and thus not useful. Instead, it is advisable to collect a limited but manageable amount of data.

Creating an institutional memory

For those applying SLM-IM, storage of the following information is essential:

- Topics that were discussed from the beginning of SLM-IM;
- The SLM-IM methodology used, and the accuracy of methods and data;
- A concise overview of the most important data;
- A summary of data that may contain a concise presentation of tables and more detailed tables in appendices;
- Source and reference periods of the material presented;
- Conclusions, recommendations and considerations that emerge when formulating the conclusions;
- Reference material and literature used;
- Remarks, impressions, observations, experiences, successes and obstacles, classified as "personal" if necessary.

Besides data, do not forget to document methodological protocols to make the SLM-IM procedure transparent

Where and how to store

Storage depends on the stakeholders' preferences. In view of the long-term character of SLM-IM, storage must be insured by an institution, organisation, or group that is likely to exist even in the distant future. If possible, various means of storage should be considered. The digital format for more efficient data processing, handling and research is as important as paper copies, posters, etc., for those who do not have access to computers.

Since first-hand information is always rare and desirable, storage of information in meta-databases with international access may be considered. Such a database must not necessarily contain all the information at one location and in the same format. But it informs users about the type of information available, where it is stored, and the procedures for getting access to this information. In this way the basic information remains available at all levels. Long-term projects or national and international (research) institutions are the appropriate organisations to initiate and maintain such databases.

Search for an appropriate long-term storage of data that guarantees permanent access for all stakeholders

Feuerstein, M.T. 1986. Partners in evaluation: Evaluating development and community programmes with participants. Macmillan Publishers Ltd, London, UK, 196 p.

Lyons Morris, L., Taylor Fitz-Gibbon, C. & Freeman, M.E. 1987. How to communicate evaluation findings. Sage Publications Inc., Newbury Park, USA, 92 p.

Van der Burg, G. & Caldwell, R.1998. Monitoring Evaluating Reporting - MER. Management tools for development organisations. CARE International (www.kcenter.com).

Follow-up

Reflecting about the SLM-IM procedure

SLM-IM not only provides information about the land management system, but also sheds light on the quality and appropriateness of the SLM-IM procedure, particularly the indicators and methods used. This information may indicate how to modify the SLM-IM procedure in order to improve it. It can also bring about changes in perception of issues or priorities among the core issues. Besides being helpful during a given project phase, SLM-IM also yields information that can be used for post-project SLM-IM. It might clarify

- who will implement the post-project SLM-IM (local government, local NGO, farmers' organisation),
- the definite set of indicators, and
- which methods will definitely be used for a reliable and cost-effective long-term SLM-IM.

Prepare for the post-project SLM-IM

What if SLM-IM is desirable but not practicable?

As long as the trend in SLM can easily be monitored with cost-effective methods, you may not face substantial difficulties. However, in the case of some indicators, you may need more detailed results, which in turn require a more sophisticated SLM-IM procedure, indicators, methods and analysis. On the one hand, these requirements may exceed your budget. On the other hand, you may not be able to prove the contribution of your activities to SLM, for example, without a sound soil survey, river discharge measurement, demographic data collection, etc. In this case you need to try to minimise the efforts and the costs of SLM-IM.

Minimising the costs of SLM-IM

To bring SLM-IM in line with the project resources, consider the advantages and limitations of the following hints

- concentrate on a reduced number of core issues
- emphasise indicators that represent more complex components (e.g. soil fertility) rather than very detailed components (e.g. the cation exchange capacity) of SLM
- focus on specific hierarchical levels (farm, community, region)
- conduct monitoring at a reduced number of representative locations
- prolong the time intervals of the SLM-IM

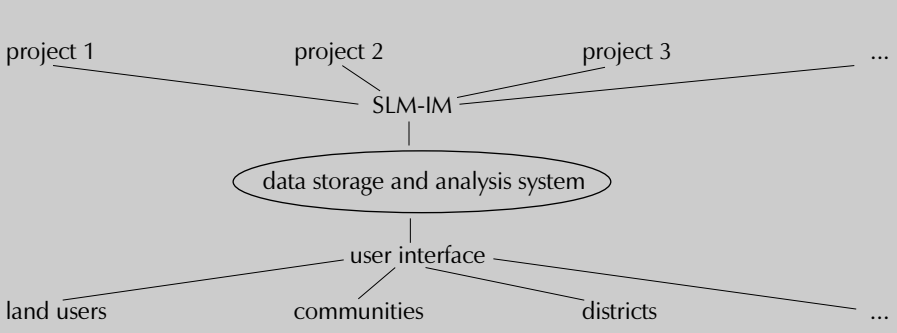
If you still do not have the means to carry out such investigations, look for solutions outside the project's scope and mandate. A first result could be a list of issues which are desirable but difficult to monitor within the given situation. List the prerequisites which are necessary, particularly the ones which are not fulfilled, and the reasons why. Then look for options to overcome these constraints. Other projects in your area may face the same types of problems and a solution could be easily found using the synergy of several organisations. If single projects are not in a position to take care of certain SLM-IM components, a common monitoring service, for instance a soil laboratory, could be jointly funded and established.

How to overcome limitations on SLM-IM

Modify and complete the following examples according to your own situation:

desirable to monitor	*prerequisites*	*fulfilled yes/no*	*reasons (if no)*	*alternatives*
soil fertility	soil survey and soil laboratory analysis	no	high laboratory costs	• establish a soil laboratory with other projects • use a national soil laboratory • purchase a portable soil lab kit
detailed land problems	well-trained field personnel	no	not justifiable for a single project	• develop a joint SLM-IM training programme with other institutions, projects and donor agencies
complex land problems • • •	detailed inter-disciplinary SLM-IM	no	high costs and labour requirements	• establish a joint SLM-IM programme with other institutions, projects and donor agencies

e.g.: a joint SLM-IM programme



Combining efforts with other projects minimises the costs of SLM-IM

For example, **Contact:** World Overview of Conservation Approaches and Technologies (WOCAT), Centre for Development and Environment (CDE), Hallerstrasse 12, 3012 Berne, Switzerland. e-mail: wocat@giub.unibe.ch