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Guidelines for the Preparation and Reporting on Globally-relevant SLM Impact Indicators for Project-level Monitoring

Guidelines prepared by the GEF MSP *"KM:Land"* on

Ensuring Impacts from SLM – Development of a Global Indicator System

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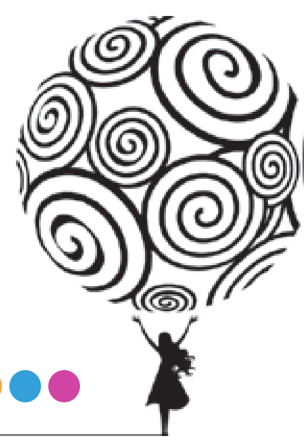
"Ensuring Impacts from SLM – Development of a Global Indicator System"
"KM:Land" Initiative



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Contents

List of Acronyms

ACOS	Advisory Committee on Official Statistics
ADB	Asian Development Bank
AfDB	African Development Bank
AQUASTAT	Global Information System on Water and Agriculture (of the FAO)
CIESIN	Center for International Earth Science Information Network
CRED	Centre for Research on the Epidemiology of Disaster
DESIRE	Desertification Mitigation and Remediation of Land – A Global Approach for Local Solutions
DNI	DesertNet International
DPSIR	Driver-Pressure-State-Impact-Response
DSD	Dryland Science for Development Consortium
FAO	Food and Agricultural Organization of the United Nations
GEF	Global Environment Facility
GIS	Geographic Information System
IADB	Inter-American Development Bank
IFAD	International Fund for Agricultural Development
KM:Land	Knowledge Management: Land
LADA-L	Local Assessment of Land Degradation in Drylands
LD	Land Degradation
LD FA	Land Degradation Focal Area (of the GEF)
LMP	Land Management Practices
LSMS	Living Standards Measurement Survey
LUS	Land Use Systems
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
NDVI	Normalized Difference Vegetation Index
NGO	Non-governmental Organization
NPP	Net Primary Productivity
PIR	Project Implementation Review
PMAT	Portfolio Monitoring and Tracking Tool
SLM	Sustainable Land Management
STAP	Scientific and Technical Advisory Panel (of the GEF)
UNCCD	United Nations Convention to Combat Desertification
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children's Emergency Fund
UNU-INWEH	United Nations University – Institute for Water, Environment & Health
WB	World Bank
WCMC	World Conservation Monitoring Centre (of UNEP)
WOCAT	World Overview of Conservation Approaches and Technologies

Executive Summary

This guideline presents a set of four global impact indicators and their methodologies which, when taken together, can be used to determine the trends in combating land degradation and desertification through sustainable land management practices that improve the productivity of agro-ecosystems while generating other associated global benefits (development, human well-being, etc.). The indicators are intended to be used under the GEF-5 portfolio of projects and programmes in the Land Degradation Focal Area which aims to improve the provisioning of agro-ecosystems and forest ecosystems, reduce greenhouse gas emissions from agriculture and deforestation, reduce vulnerability to climate change and other human-induced impacts, conserve biodiversity and water resources in production landscapes, and improve livelihoods, particularly of the rural poor.

An iterative process of expert discussions, compilations and reviews of available methodologies, a dedicated pilot testing exercise (KM:Land, 2010), and a further review of methods and guidance led to the recommendations and guidance presented in this document (see UNU-INWEH, 2010 for reports of the KM:Land project).

The indicator set is meant to cover the broad range of problems that result in land degradation (LD), usually caused by multiple and coupled biophysical and socio-economic factors. The indicators are also intended to cover the actions used to prevent and reverse land degradation, that is, sustainable land management (SLM) practices.

This minimum set of indicators is intended to be used as a starting point for GEF-5 portfolio projects and programmes to address LD and SLM regardless of the frame of reference taken by different programmes and projects. However, ultimately each well-defined problem will require additional indicators to complement this minimum set.

This guideline includes a description of a conceptual framework that accompanies the indicators. The framework is a hybrid of the Driver-Pressure-State-Impact-Response (DPSIR) and Millennium Ecosystem Assessment (MA) frameworks that are relatively well known in this field. This merged framework can be used to ensure that the indicators capture the complexities of LD and SLM, and help to provide information for decision-making on better land management practices leading to improved human well-being.

A second framework to operationalise the use of the indicators is also included in these guidelines as an aid to project formulation, inception, implementation and evaluation. As projects often have problems in determining and initiating critical baseline studies that are needed for evaluating the impacts of projects, this guideline includes an extended section on this aspect of data collection.

Each indicator is described in detail with up to three sub-indicators for measurement at the project level, and takes into account the experiences of a pilot testing exercise of the indicators in five GEF-funded projects in four countries (Dominican Republic, Namibia, Senegal and Tajikistan). It is expected that further development, adaptation and strengthening of the indicators will occur as they are used and applied in other projects, and this document should thus be viewed as a reference point for future elaboration and refinement of the indicators.

1 Introduction

This document provides a user-friendly guide on the use of a set of four global indicators to capture the impacts of SLM achieved through projects funded in the Land Degradation Focal Area (LD FA) of the Global Environment Facility (GEF). The projects and programmes under the LD FA are expected to: improve the provisioning of agro-ecosystem and forest ecosystem services; reduce greenhouse gas emissions from agriculture, deforestation and forest degradation; increase carbon sinks; and, reduce vulnerability to climate change and other human-induced impacts on land (GEF, 2010). Since its launch in 2003, the strategic approach of the LD FA has evolved through a series of funding cycles and objectives to a point where it is ready to measure impacts. These guidelines are intended to enable project teams to immediately take up the four selected indicators for use in capturing global environmental impacts achieved through SLM, and to encourage development and improvements on the use of these indicators (see Box 1 for definitions of 'Impact' and 'Indicator').

The measurement of impacts on the ground achieved through SLM helps facilitate improved adaptive management, both within the targeted GEF-funded projects and beyond.

Box 1: Definition of Key Terms

Impact	Positive and negative, primary and secondary long-term effects from changes in state brought about by driving forces (indirect drivers) and pressures (direct drivers) (after OECD/DAC, 2002).
Indicator	A quantitative or qualitative parameter, or a value derived from parameters, which points to or provides information about the state of a phenomenon/environment/area. Indicators present clear and simple information on selected issues of concern, even when the targeted issue is itself highly complex (from OECD/DAC, 2002; OECD 1993; Hammond *et al.*, 1995).

Through the KM:Land Project 'Ensuring Impacts from Sustainable Land Management', a set of five[1] global indicators to capture the impacts of SLM achieved through GEF LD FA projects was selected through an expert consultation process (UNU-INWEH, 2010). This set of indicators (Table 1) was designed to capture the complexities of LD and SLM that include interacting biophysical, political, social, cultural and economic factors, reflecting the widespread understanding that impacts need to consider these interacting factors through interdisciplinary approaches (see MA, 2005; Reynolds *et al.*, 2011; Schwilch *et al.*, 2011). This set of indicators further reflects an emerging global scientific perspective concerning the definition of impacts to be anticipated from the efforts combating LD (e.g. UNCCD, 2011).

The tracking of progress towards impacts in relation to these indicators at the portfolio level requires relevant information to be collected at the project level from each of the GEF LD projects in a targeted manner, enabling and informing the collation and review of information at the portfolio and global levels by the GEF, its partner Agencies and stakeholders. A set of project-level indicators to provide necessary information for tracking four of the five global impact indicators was identified through several Expert Workshops of the KM:Land Project (Table 1).

The global impact indicators have been designed to be consistent and compatible with other processes for the generation of environmental information, such as the Guidelines and Methodologies for Reporting on Indicators of Sustainable Development (UNDESA), the Human Development Index (UNDP), the Millennium Development Goals (MDG) indicators, and the GEF Portfolio Monitoring and Tracking Tool (PMAT). Beginning in 2012, national reporting to the United Nations Convention to Combat Desertification (UNCCD) will include mandatory reporting on land cover status and proportion of the population above the poverty line in affected areas, while other impact indicators may be reported voluntarily. The proposed global impact indicators for the GEF LD FA addressed in this document are

[1] Although five global indicators were selected, only four were developed through the KM:Land project (see footnote 2).

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compatible with this system, and are designed to strengthen and complement national level collection and use of relevant data. It is therefore hoped that the process and associated guidance provided here may be of interest to the wider SLM and development communities beyond the GEF LD portfolio.

Table 1. List of Global SLM Impacts and Indicators Measurable at the Project Level*

Global Impact	Indicators to be Measured at the Project Level
Land Use/Land Cover	Global Land Cover Classes (water, built-on and bare areas, cropland, forests/woodlands, grassland)
	Country-specific Land Use Systems
	Project-defined Land Management Practices (for projects operating at land use level)
Land Productivity (in different land cover and land use systems)	Annual Agri- and Silvo-cultural Production (crops, livestock and forests)
	Crop Diversity (alternative varieties, recorded # and % of total production)
	Production per Unit of Physical Inputs (i.e. water, agro-chemicals)
Water Resources Availability	Available Water Resources Volume in the Watershed
	Extracted Water Resources Volume by Land Use System across the Watershed
	Ratio of Available Water Resources Volume to Extracted Water Resources Volume
Human Well-being	Percentage of Rural Population below the National Poverty Line
	Maternal Mortality Ratio (according to national MDG reporting)
	Proportion of Chronically Undernourished Children under the Age of 5 in Rural Areas (according to national MDG reporting)

*Carbon-related indicator: to be developed through an external initiative not covered in this document[2]

Through practical use and continued scrutiny by SLM project stakeholders and scientists, the approach and methods outlined in this document can be adapted and strengthened, leading to the creation of a harmonized and/or standardized[3] global system for tracking SLM both within, and beyond, the GEF LD portfolio. The challenge in the creation of this document has been to present a requisite degree of simplicity and a limited number of indicators to enable project teams to report on each indicator to the extent of their available capacities. While orienting project teams to current available and state-of-the-art measurement approaches for each indicator, an attempt has also been made to allow space for project teams to anticipate, and indeed make contributions to, ongoing scientific progress in relation to each of the indicators. This set of indicators should therefore be viewed as a starting step in the application of indicator systems that can be applied from national to global scales (for further discussion on this topic, see Reed *et al.*, 2011; Schwilch *et al.*, 2011, Sommer *et al.*, 2011; Verstraete *et al.*, 2011).

In addition to the five selected indicators above, a further set of indicators is needed to account for factors beyond the control of the project which could have a major influence on the direction of change. This contextual information will ensure that the indicators are corrected for trends not related to a project's intervention. This is necessary to ensure that observed changes in the project-level impact indicators can be attributed to the impact of the project and are not the result of general changes in the natural or human environment.

[2] Although five global indicators were selected for use in projects, the carbon-related indicator was not addressed by the KM:Land project as methodologies are under development through a separate GEF-funded initiative on carbon benefits (see Carbon Benefits Project at http://carbonbenefitsproject-compa.colostate.edu/).
[3] Here, harmonize means to compare the same variable measured in different ways, and standardize means to use only one agreed method.

The following contextual information has been selected for the impact assessment of GEF projects:

Table 2. List of Contextual Indicators to Complement the Global Indicator Set	
Indicator	**Description**
Precipitation	30-years of mean monthly rainfall (for near stations/gridded)
Extreme Natural Events	Frequency and magnitude of extreme natural events, e.g. floods, droughts, storms, fires, etc., including historical data
Extreme Non-natural Events	Occurrence of any other extreme events, e.g. violent conflicts, in-/out-migration, civil unrest, market crisis, etc.
Population Density	Population within a given area (e.g. project area)
Market Prices	Market prices for key agricultural inputs and outputs

This list can be adjusted to specific local needs and conditions. If a significant change in these contextual indicators is observed, it will be necessary to further investigate if this change has influenced the obtained project data, which global impact indicator(s) and sub-indicator(s) have been influenced, and in which way. Further details on these indicators are included in Appendix I.

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Overview of the GEF Project Planning Process

2

The GEF LD portfolio consists of projects and programmes aiming to achieve impacts on the ground affecting land cover, land use and land management, productivity, water availability and human well-being, either directly or indirectly, and over a range of time frames and spatial scales. The process and format for the preparation and implementation of GEF projects enables the prediction and measurement of these impacts at a series of key points in a project's lifetime:

Project Preparation: A detailed project document, describing the objectives, outcomes, indicators and benchmarks to be included in the project logframe is prepared. This provides a baseline for the project's activities and sets up a process for measurement of a project's progress and activities. The project document is reviewed by all stakeholders, including the GEF Scientific and Technical Advisory Panel (STAP).

Project Inception: The project logframe and practical arrangements for monitoring and evaluation are reviewed and agreed to by all stakeholders. Adjustments are made to the proposed project document where necessary.

Mid-term Evaluation: An independent, external expert review of progress towards the achievement of the project's objectives and the measurement of the project's indicators is undertaken. Revisions to the logframe are made if necessary.

Terminal Evaluation: An independent, external expert review of the project's achievements is made, and lessons learned from the project are documented for the benefit of future initiatives.

Post-project Evaluation: Where impacts are anticipated to become evident after the closure of a project, these will require institutions remaining in place with sufficient capacities to measure them at the appropriate time. At present, it is not usual for projects to reserve funds for this purpose.

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As described above, the design of the Monitoring and Evaluation system for each project is an iterative process where indicators may change over a project's lifetime. Consistent use of the global indicators in all GEF LD projects provides a basis for more consistent activities supporting the measurement of impacts, even though targets for anticipated results from these measurements may be adjusted by the project teams based on contextual factors arising during project implementation. The key periods for the review and adjustment of these targets are at project inception and mid-term.

Given this background, the following sections provide a guide to measuring impacts from SLM within the time frame and process of GEF project preparation and implementation, as described above. Sections 3 and 4 discuss the use of two relevant frameworks, one conceptual and one operational, in the development and use of the global indicator set. Section 5 provides guidance on the availability, use and collection of data needed for the measurement of impacts. Finally, Section 6 reviews each of the selected global indicators, listing specific information required during the preparation and inception phases (establishing the baseline), mid-term, and end of project, and Section 7 offers advice on the interpretation and presentation of the indicators.

3 An SLM Framework for Monitoring and Assessing Impacts from SLM Interventions

A fusion of globally-recognized interdisciplinary concepts (e.g. MA, 2005) with tried and tested Driver-Pressure-State-Impact-Response (DPSIR) models for systems analysis and the identification of impacts (Smeets and Weterings, 1999) enabled scientists participating in the KM:Land discussions to overcome the disciplinary and definition-related challenges of indicators by developing a framework that merges the two concepts (see Figure 1). Details describing the development of the conceptual framework and showing the relationships between the DPSIR and MA concepts are included in Appendix II. This framework opened the way forward to the identification of relevant indicators and methods for their integrated use at both project and global levels.

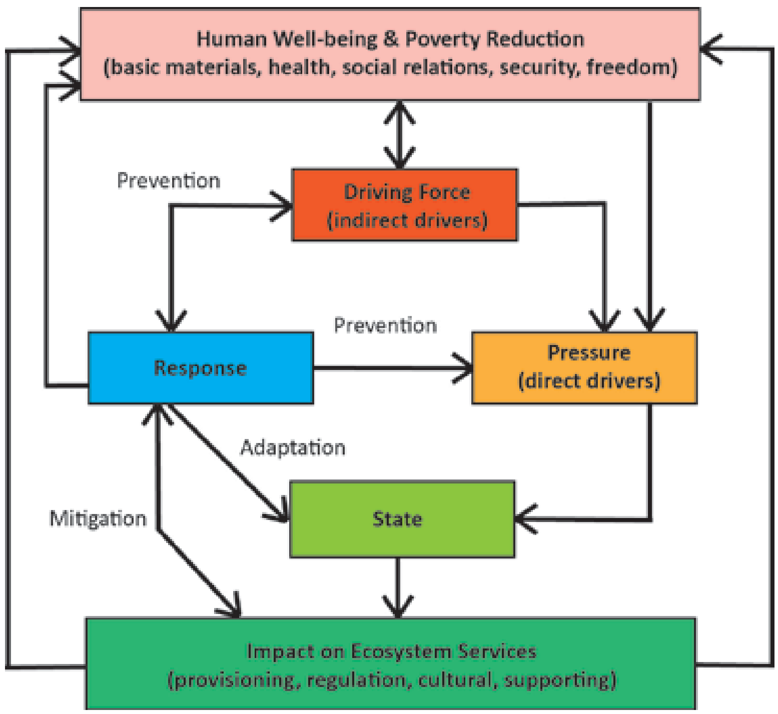


Figure 1. Hybrid SLM Framework for Monitoring and Assessing Impacts from SLM Interventions.

While the identification of a concise set of global impact indicators and the definition of associated measurement methods are required in order to enable the more systematic measurement of SLM impacts, it is well recognized that SLM and its impacts are complex. Definitions of SLM and anticipated impacts will always vary according to the perspectives of different stakeholders, and are often influenced by perceptions of scale and contextual factors. The selection of global SLM impact indicators by the GEF LD FA should therefore not end scientific debate on these matters, but should rather provide a global set of useful generic scientific practices and data reference points, feeding a wider scientific dialogue. Such discussions should enhance the quality of SLM and support advocacy for its mainstreaming.

Each individual project in the GEF LD portfolio already routinely identifies and tracks its own context-specific intended outputs, outcomes and impacts; this is done through a logframe and indicators that are tailored to a project's activities and context. However, these may not necessarily be collated meaningfully at the portfolio or global level. These existing, internally-managed project systems sometimes, but not always, include the measurement of the global impacts that are identified as essential to the LD portfolio. Beginning in 2011, it is planned that GEF projects will select and monitor elements of a common system designed for tracking SLM outcomes (through the Portfolio Monitoring and Tracking Tool {PMAT}). The proposal of the hybrid SLM framework with the overarching set of core global impact indicators proposed in this document is not intended to replace the PMAT, but to enhance and complement the existing provisions for monitoring and evaluation of results in each project logframe.

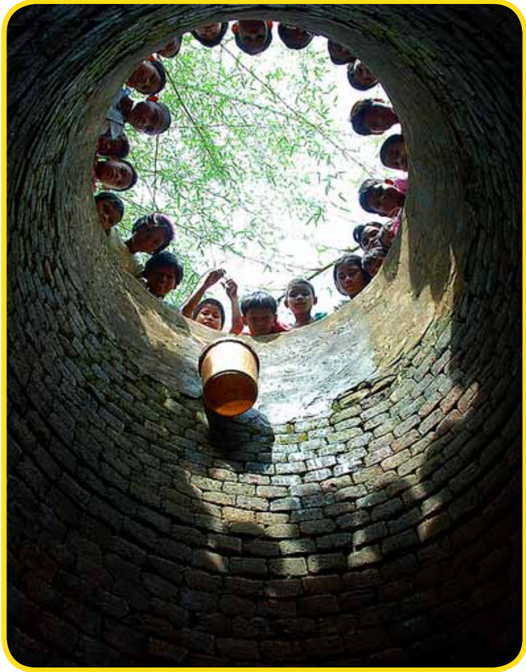
An Approach to Harmonize and Strengthen the Measurement of Impacts: A Proposed Operational Framework

4

While this guidance document focuses on the global indicators to be used by GEF LD FA projects and programmes and describes the methods available to monitor and assess them, there is also a need for guidance on a practical approach to operationalise their use. Many approaches have been suggested that are generic and applicable across a wide range of contexts (e.g. UNU-INWEH/DSD/DNI, 2010; UNEP-WCMC, 2010); however, it is recognised that these approaches would need to be adapted to different contexts in the execution of GEF LD projects.

Here, a suitable operational framework drawn from the DESIRE project of the European Union (see Reed *et al.*, 2011) is suggested. The use of this operational framework is not intended to be prescriptive; however, it is intended to highlight the need for a road map for project managers to practically apply and use the global indicator set and to suggest a practical approach for doing so. The basic structure of this framework also fits well with the GEF LD FA's focus on SLM and coincides with the GEF project planning process described in Section 2.

This framework is applicable at the project level, where usually a broader range of indicators than the proposed set of global indicators is selected by project teams. It is expected that project teams will harmonize their particular set of indicators, based on their context-specific intended outputs, outcomes and impacts, with one or more of the global indicators from the proposed set. For example, land uses may be sub-divided into more categories than those suggested in this guideline, collecting a greater range of detailed productivity data.



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The suggested approach involves the following four phases, in a total of eleven steps (Figure 2):

- Phase 1 (orange): Establishing the system's boundaries, baselines and goals.
- Phase 2 (red): Identifying, evaluating and selecting remedial SLM strategies.
- Phase 3 (blue): Identifying and evaluating sets of indicators.
- Phase 4 (green): Applying remedial intervention options and strategies, and monitoring progress towards the goals using selected indicators.

Definition of the Impact Area and Time Frames

The following essential activities are required in order to predict and measure changes in the global indicators:

- Definition of the project area in which impacts on the indicators would be anticipated.
- Definition of a time frame over which measurable changes in the indicators would be anticipated.
- Identification of changes, if any, to be anticipated within the project duration.

Often, GEF LD projects operate at a strategic level, with impacts on the ground anticipated to follow shifts in national decision-making over the longer term. In these cases, the impact area would be at the level of the targeted countries, but the time frame might be longer than the GEF project duration. In such cases, implementation of the proposed impact indicators would be required to take place at the national level by the responsible institutions over the long term in order for impacts to become visible.

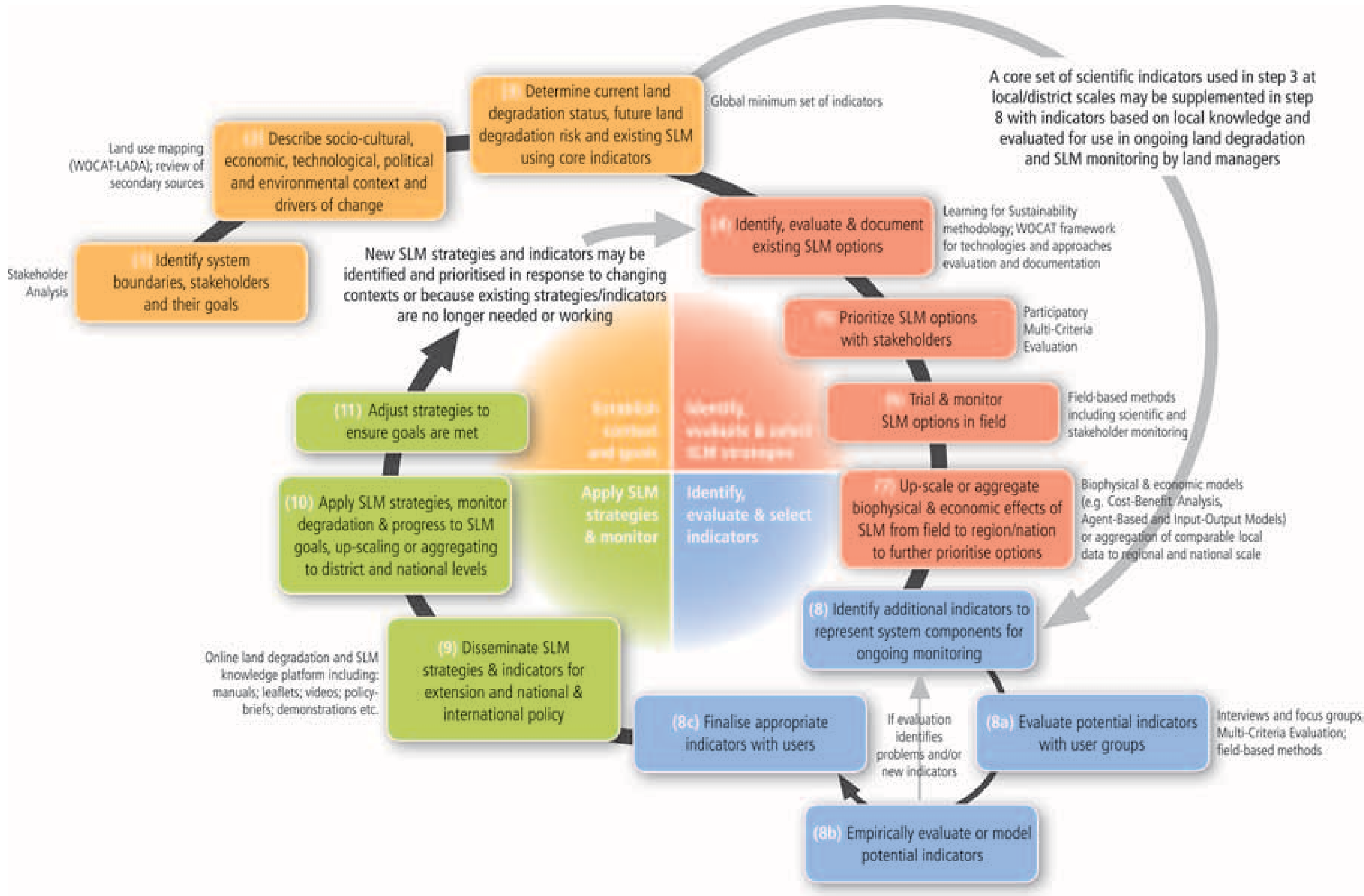

Figure 2. Conceptual Model of an Operational Framework for Applying and Using Indicators at the Project Level (UNU-INWEH/DSD/DNI, 2010; Reed et al., 2011).

Many GEF LD projects operating at the strategic level also incorporate a demonstration approach. In such projects, an intervention area is often defined at a relatively large spatial scale within which one or more limited areas are selected to pilot activities on the ground. The success of these interventions is subsequently anticipated to lead to a wider long-term uptake. Where a demonstration approach is adopted, the proposed indicators can be implemented across the whole area targeted by the project, with positive results anticipated to appear firstly in the demonstration sites.

In order to enable the prediction of impacts, the definition of the project area(s) must be clearly recorded as indicated in **Step 1** of the operational framework (Figure 2). Therefore, the project document should contain a written indication of the project area and a legible map. If varying degrees of impact are anticipated within the project area, these could also be identified on the map. It may be that consultative processes during project implementation could lead to adjustments to the exact extent and location(s) of the intervention area(s). In this case, the adjustments to the intervention area, and the anticipated impacts in the intervention area, should be systematically recorded on the project documentation and map, reflecting the consultation process with the project stakeholders. The types of boundaries vary, and may be based for example on biophysical aspects such as a watershed or agro-ecological zone, or on an administrative unit such as a district; each project will need to determine its own boundaries appropriately.

It is well recognised that all stakeholders with an interest in the boundary area need to be included in the project, ranging from local and national policy-makers to land users, with the latter including both settled and mobile groups. The interest of each group may stretch across spatial scales beyond the scale of interest; this can ensure that stakeholder interactions across spatial and temporal scales are considered when determining the goals, constraints and context within which each group operates (**Step 2**).

Predicting Land Management Scenarios With and Without the Project

Figure 3 shows a hypothetical example of changes in land area under different land covers to illustrate the use of indicators in areas with and without project intervention.

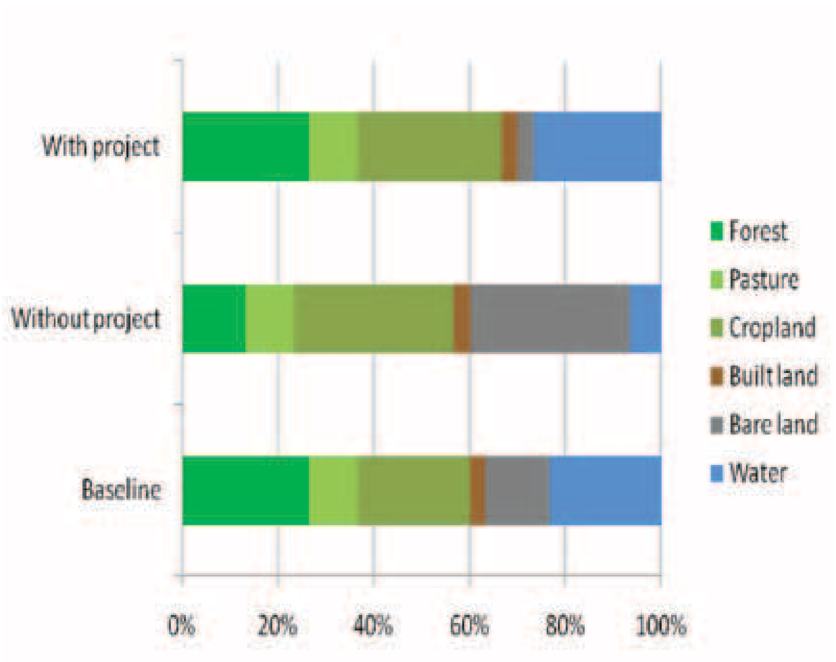

Figure 3. Example of Hypothetical Scenarios for Land Area under Different Land Covers.

Currently, the design of SLM projects for the GEF LD FA requires a definition of the baseline situation and a prediction of the incremental benefits anticipated from the project intervention (**Step 3**). These are usually described, but not quantified. The quantification of these scenarios for each impact indicator at baseline and in with- and without-project scenarios would help to clarify the targets to be used for monitoring and evaluation during the project, and, if necessary, during the post-project period. For example:

- Baseline situation (**Step 3**): The current land management situation has resulted in a land area divided as follows: 28% forest; 9% pasture; 23% cropland; 4% built land; 13% bare land; and 23% water (Figure 3), leading to the current situation on water availability, productivity and human well-being.

- Without project scenario: After the proposed project duration (e.g. 5 years), without the project intervention, the land management situation has resulted in a land area divided as follows: 13% forest; 11% pasture; 26% cropland; 4% built land; 34% bare land; and 6% water, leading to negative impacts on water availability, productivity and human well-being.

- With project scenario: With project implementation, after the proposed project duration (e.g. 5 years), the land management situation has resulted in a land area divided as follows: 28% forest; 9% pasture; 30% cropland; 3% built land; 4% bare land; and 26% water, leading to positive impacts on water availability, productivity and human well-being.

Quantifying these scenarios would then enable projects to set targets for what they hope to achieve during the project intervention (e.g. increased productivity, increased water availability, improved human well-being, etc.). The inclusion of this quantified presentation of impact scenarios in the project document should be introduced as an essential requirement to support effective planning and use of the impact indicators (see GEF PMAT for more details).

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Conducting a Baseline Review of Available Data (Step 3)

The presentation and analysis of all available baseline datasets during the project preparation and inception phases for each indicator is a practical requirement that enables identification of benchmarks and sources of information to be recorded in the project logframe. This process should lead to the effective targeting of resources for data collection during the project to areas where there are particular gaps or opportunities to effectively supplement existing datasets. The baseline data may require review and updating at project inception depending on the interval of time that has passed between the project preparation and inception phases.

Baseline data to be included in the baseline review in the project preparation phase should include all relevant data that is readily available to the Agencies involved in the design and review of the project. This would include all routinely collected and published national datasets relevant to the impact indicators. The generation of new datasets to supplement the baselines through dedicated surveys or other data collection activities is sometimes supported through Project Preparation activities, which are approved by the GEF on a case-by-case basis.

At the project preparation stage, information on the impact indicators and scenarios might be approximate, depending on the best available information. This would be refined throughout a project's duration. Thus, the initial assessment of baseline and with- and without-project scenarios might be altered during the project, as more detailed information is collected and a deeper understanding is achieved, and unforeseen factors affect the contextual situation of the project. Sources of baseline data must be well documented in order to enable subsequently recruited members of a project team to identify and pursue them once the project is approved. Strategic agreements for access to data may be required to enable data sharing amongst national agencies.

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In addition to information on the impact indicators, the collection of baseline data should include compilation of available information on contextual factors considered likely to influence the predicted impact scenarios (see Section 1 above and Table 2). Such contextual factors could include: climatic data, especially rainfall or aridity; risks of extreme events; demographic trends, including risks of disease, conflicts and humanitarian crises; and economic factors, including effects on local markets for SLM produce and local economic dependence on external trade (see Appendix I for further details). The process for identification of contextual factors may be considered similar to that of a conventional risk assessment, which is already routinely conducted for most projects.

The compilation and review of baseline data on the impact indicators and contextual factors should be presented in the initial project document. Needs for ongoing compilation and assessment of key data should be considered and built into a project's design through the initial review. Project documents should also include a specification of monitoring arrangements to be applied for each contextual factor, and allow for revisions to impact targets that would be implied following a given level of change in the contextual factor. Such provisions would ensure that the necessary revisions to the projected impacts and associated targets would become a routine procedure, to be triggered by a change observed in the contextual indicator. In this way, a revision to the targets would not require a lengthy process to obtain approval amongst project stakeholders and Agencies. At the very least, continued data collection on contextual factors likely to affect indicator scenarios should include the best available climatic datasets for the project area.

Establishing a baseline of land status against which future progress can be monitored can involve local and/or distant land use mapping (e.g. remote sensing), depending on the availability of the information (**Step 3**). However, all remote sensing activities need to be ground-truthed at the local level through survey work.

The indicators used to establish the baselines should correspond to one or more of the proposed global indicators, although they will usually be supplemented by additional indicators used at local levels. This process is reiterated in **Step 8** where indicators used by land users are further identified for decision-making on SLM. It is this interaction with the global set of indicators that facilitates comparability across spatial and temporal scales (Reed *et al.*, 2011). The flexibility introduced in Step 8 allows land users to choose and supplement indicators that are relevant to their goals. This is a crucial activity that achieves comparability at scales beyond the project areas, e.g. at national, regional and global scales, while remaining relevant for decision-making by land users. This requires some effort to harmonize and/or standardize some of the indicators with those included in the global indicator set.

Steps 4, 5, 6 and **7** of the framework focus on identifying, selecting and evaluating SLM options that can be implemented or tested on the ground. A large suite of options currently being practiced is now available through the efforts of WOCAT and others; these efforts have helped to catalogue SLM practices, outline the benefits and constraints of each one, and provide guidelines for their application (WOCAT, 2007; Liniger *et al.*, 2011). Additional efforts will be needed to determine the costs and benefits of these options. GEF LD FA projects and programmes will need to scale up or aggregate the impacts of remedial actions through SLM options using the global indicators (**Step 7**). Here, the application of new biophysical and economic models can offer assistance to move the scales up from the project area to regional and global domains, depending on the scope of the project (details of these developments are found in Schwilch *et al.*, 2011; Reed *et al.*, 2011, Sommer *et al.*, 2011).

Steps 9, 10 and **11** focus on the required dissemination and knowledge management strategies for SLM options and its indicators. These can involve a variety of media and means, ranging from policy briefs, booklets for farmers, videos and films for younger audiences to scientific publications for the science community.

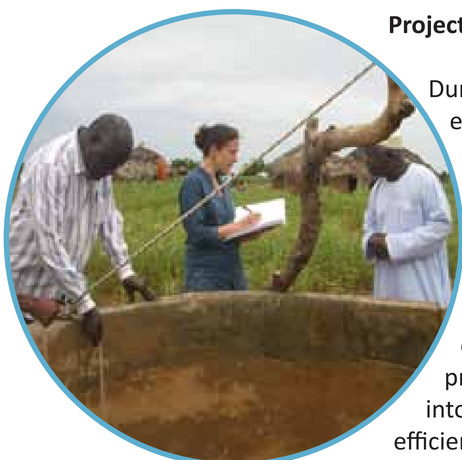
5 Planning Data Sources and Data Collection Methods

Using Existing National Data and Filling Gaps

In order to plan for the data collection methods to be used during a project, it will be important to refer to national datasets that have an institutionalized relationship to decision-making and national priorities. Depending on the findings of the baseline review (as described in the previous section), much of the data/information required for tracking the required global impact indicators may be obtained through ongoing national data collection processes. However, the analysis of the available baseline datasets is likely to reveal strategic gaps which the project could fill using some of its own resources. These gaps may include, for example, the spatial resolution of the available datasets and the relation to a project's intervention area, or the temporal resolution of the data and its relation to a project's milestones for reporting, or other critical dimensions of the dataset required to capture impacts from project activities.

Sometimes, limitations in available datasets, as identified through the baseline review, may be overcome through co-operation with the existing national data collection agency. In other instances, projects and its stakeholders may be required to initiate new data collection activities in the project area. To facilitate this process, it is suggested that projects follow the pre-established national data collection methods to easily supplement and compare to national datasets. However, the project may decide to introduce alternative methods to generate the required information if they so wish. It will also be important to efficiently prioritise data gaps and to select options to address them that will make the best use of a project's resources, available datasets, and existing national capacities, building on the analysis of the baseline.

The remainder of this section considers a generic menu of data generation approaches available within SLM.



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Project Databases

During the process of implementation, project personnel necessarily engage with land managers and users, exchanging information on land use management practices, resources availability, productivity and socio-economic issues. Carefully planned recording of details routinely encountered by project staff during the course of project activities can provide a rich database to support the mapping of indicators and comparison to national datasets. Essential issues to be addressed at the preparation stage concern the required geographical scale and referencing of information, as well as the content, structure and management provisions for the database. These requirements can then be translated into practical protocols enabling project staff to integrate ethical[4], precise and efficient collection of the required data where opportunities arise through their routine activities during project implementation.

Project Activities Involving Community Focus Group Discussions

Many SLM projects incorporate participatory planning exercises where focus groups are assembled, whether they consist of village elders, women's groups, producer associations, NGO-members, or others possessing knowledge of the local resources, land uses and practices. These activities can generate useful factual information and mapping elements relating directly to the project-level impact indicators on land uses and management practices, productivity, water availability and household income. The composition and modalities of the groups taking part in such activities should be recorded as accurately as possible in order to enable an external analysis of possible bias, and to provide the

[4] Responsible Agencies are expected to ensure that project documents refer to any relevant published guidelines that may apply in each country, e.g. concerning participant consent and data protection.

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option for subsequent repetition in order to identify changes. A range of guides to good practices in such processes are available for consultation (see for example, Herweg and Steiner, 2002 and LADA-L, 2009).

Use of Interviews and Survey Data

Project staff will necessarily have interactions with a range of individuals, including land users, land managers, policy-makers and other stakeholders. Systematic pursuit of information on the impact indicators may be incorporated into these interactions, where interviews are recorded by the project staff and compiled in project databases, as described above. However, it is important to consider possible advantages, disadvantages and various potential implications in terms of bias in responses collected through interviews conducted by project staff or other individuals, depending on how their relations to the project are perceived by respondents, and vice versa.

Projects may sometimes consider engaging a student, local person, or an independent outsider as a consultant to pursue a particular issue through a dedicated interview series or survey. In other cases, a group of carefully selected enumerators may be required to collect survey data simultaneously through multiple structured interviews or the use of a questionnaire. In these cases, the sampling frame should be designed in relation to available information concerning the total population in the project area, and the protocol for the survey implementation should be discussed and documented by the enumerators.

Generic guidance on survey design is available from the International Household Survey Network (www.ihsn.org). In all cases, the key to the effective use of data generated through interviews concerns the documentation of this information, targeting relevant facts to be stored in project databases, accounting for possible bias, and enabling replication of the data collection approach, if needed. Important details could include date, time, location, identifiers of the interviewer and in some cases, also the interviewee, as well as any other relevant contextual factors that might influence the information generated.

Field Measurements for Collection of Biophysical Data

Methods for field measurement regarding water availability and use and productivity are likely to conform to nationally established practices; for example, regarding the use of: piezometers for measurement of groundwater levels; gauges and meters for water extraction; calculation of the weights and volumes of crops and agro-chemical inputs from measurements in local units; standardized procedures for assessment of dry biomass; etc. Opportunities to enhance ground-truthing of available maps of land covers, land uses and land management practices can be efficiently incorporated into the design of such field data collection activities where a clear plan is in place from the outset of a project. In this way, several essential pieces of information could be collected through a single activity in the field rather than through a series of separate dedicated surveys.

The greater the degree to which local land users, students and responsible officials are consulted and engaged in the design and implementation of biophysical field data collection, the more appropriate and sustainable the field measurements are likely to be. Planning for, building in, and maximizing this engagement throughout the project implementation will ensure efficient use of resources, will multiply the benefits obtained through the project in terms of increased local capacity, and will contribute to the sustainability of the local monitoring activity.

Documenting Metadata

Since data to be used to measure the global indicators will necessarily come from a wide range of different sources and will involve the use of different methods, depending on context, these different sources and methods must be clearly documented to facilitate consistent interpretation of data collected over time and across the portfolio. This will facilitate the possibility for the GEF and other partners to harmonize the range of methods used to collect data, if they so wish, at a later stage. The data profiles will offer a means through which this can be achieved through a portfolio-level review. The profiles will also enable each project to continually review its own methods for data collection, make comparisons to those used in other projects, and assess the scope and options for further harmonization or improvement of data quality.

Metadata describe when, where, how and by whom the data were collected. Following the review of baseline data, a metadata profile (Table 3) for each of the datasets to be used in the reporting on indicators should be compiled and documented in the monitoring and evaluation (M&E) plan as it appears in the project document.

Table 3. Data Profiles (adapted from Ditor and Engeland, 2001)

Data	Definition
Geographic Coverage	The geographic area covered by the data
Length of Data Series	Beginning and end dates and/or time (years, months, days)
Smallest Geographic Unit	The smallest geographic scale at which the data is relevant (e.g. village, municipality, province, etc.)
Assumptions and Caveats	Considerations that should be kept in mind when interpreting the data
Quality Assurance Procedures	Measures and checks that have been performed to guarantee the quality of the data
Frequency	How often the data is recorded (hourly, daily, monthly, yearly, etc.)
Sources and Contact(s)	The agency responsible for collecting the data and/or an appropriate contact person
Methods	The monitoring, surveying methods and calculations that are used
Reliability: Confidence Limits	Data quality and reliability based on the collection methods and other aspects of the data

At inception, the M&E plan should be reviewed. At this time, further details may need to be added to the metadata profiles in order to clarify the decisions made in the finalization of the M&E plan and the tasks of the project staff with regard to data collection. Each time the indicators are subsequently reported during the project, an updated set of metadata profiles should be attached with the reported dataset, and the overall M&E plan should be updated and shared with the project stakeholders. This process is intended to build in quality control to the data collection and reporting process.

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Reporting of Global Impacts by Indicator

6

In this section, each global impact indicator, and the sub-indicators associated with each one at the project level, are described and presented in a summary table detailing units of measurement as well as sources and methods for data collection. Each indicator has also been placed within the context of the hybrid SLM framework presented in Section 3; however, it may be useful to note that each indicator may fit into one or more categories, and therefore this placement is subject to interpretation and change when there are difficulties in measuring responses. For example, state of land can be used as a proxy for changes in ecosystem services and subsequently changes in human well-being when the latter occurs over long time periods. Finally, indicators and their units of measurement have been chosen in order to be compatible with the GEF-5 Portfolio Monitoring and Tracking Tool (PMAT).

A series of Worksheets for use in reporting data on the four impact indicators at the preparation, inception, mid-term and end-of-project phases are presented (one Worksheet per impact indicator). Each Worksheet contains a series of Worktables which are divided according to the scale of the project area, by cover type and land use system, and by cover type addressing land management practices within each land use system. A fifth Worksheet on the contextual indicators has also been included.

The reporting Worksheets provide space to list the baseline and targets for each indicator. Where changes occur in contextual assumptions related to the targets, these should be updated in the Worksheets by the project team. It is suggested that an updated data profile be submitted with the reporting Worksheets (see Table 3 and Section 5).

Indicator I: Land Cover, Land Use and Land Management Practices

The location and extent of Land Cover, Land Use Systems (LUS) and Land Management Practices (LMP) are key State indicators, capturing not only impacts from SLM projects, but also locating and shaping the nature of the effects to be anticipated in the other impact indicators.

Table 4. Indicator Definitions and Guidance related to Land

Project Indicators	Units	Sources and Methods for Measurement
Land Cover (differentiating between water surfaces, built land, bare land, cropland, forests/woodlands, grazing land)	1) ha and % of total under each class	1) Participatory assessments 2) Remote sensing data 3) National and local land use maps 4) National and local agricultural surveys and land degradation assessments
Land Use Systems (defined by each project)	1) ha and % of total under each land use system	
Land Management Practices (defined by each project)	1) ha and % of project area where SLM practices are applied	

Land Cover

The delineation of the land cover categories using global land cover classifications (see Nachtergaele and Petri, 2009) should be based on remote sensing data from dates selected to correspond to the baseline, mid-term and completion dates of the project. These observations should be repeatedly ground-truthed throughout the project activities, and revised if necessary, based on the findings of the ground-truthing. By the end of the project, a clear and independently replicable approach to the interpretation of remotely-sensed land cover classes in the project area should be available. This would enable other users outside the project to continue to track changes in land cover in the project area over a longer period, if required.

The field of land cover analysis is continually evolving, and many reference materials are available on the internet[5]. A basic introductory guide to relevant concepts and methods for land cover analysis using remote sensing is provided by Lillesand and Kiefer (various editions, e.g. Lillesand, Kiefer and Chipman, 2007).

Land Use Systems

The generic global land cover types in the project area can be further split into sub-categories according to nationally or locally defined LUS (see Nachtergaele and Petri, 2009). For example, cropland can be sub-divided into annual or perennial cropping; extensive or intensive grazing land; rain-fed and irrigated land; etc. Although these categories are anticipated to vary in each country according to national land use classification systems, a series of possible examples is provided in Worksheet 1 on Land; each project should modify this Worksheet to suit its needs.


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In theory, a large number of different LUS might be identified in relation to each cover type in any given project area. However, in practice, project teams will want to streamline their selection of LUS classes in order to retain a manageable number of classes to track, bearing in mind that further sub-divisions may be created for different LMP. This is a necessary exercise in the simplification of a complex reality in order to enable coherent synthesis at the global level.

In some cases, project teams will find that LUS classes may overlap. For example, in a forested area, some livestock grazing may take place. It will be up to the project team to determine and document to what extent these overlaps are significant, whether they can or should be recorded, or whether an additional LUS class is needed.

Points for Consideration

Projects should, wherever possible, avoid hiring short-term consultants to provide mapping services on a one-off basis. Ideally, the development of GIS databases would be undertaken in conjunction with the compilation and maintenance of other databases used by the project and/or by local stakeholders. This will enable the revision and updating of maps and classification systems to be handled effectively and efficiently. This may require the staff of a local authority or a project office to obtain appropriate software, pursue training, and to become familiar with its use. Some GIS software with self-explanatory manuals are freely available (for example, ArcGIS; see www.gsdi.org).

LUS and their sub-division into LMP, including SLM practices, can be identified through participatory workshops (see www.wocat.net and Liniger *et al.*, 2008), or directly through project implementation activities in the field. The selection of these classes will reflect the practices of interest to the project. The identification of management practices in the project area should focus not only on the target SLM practices, but should also include the observation of any alternative practices in use. This will enable comparisons between the full range of options open to land users and improve the presentation of different land management scenarios.

Land Management Practices

Project teams may define as many LMP classes as they find necessary, although it is not advisable to define more classes than can effectively be tracked through the project activities. The worktables provided in Worksheet 1 provide an example of the reporting format for information on LMP sub-divided by i) land cover, ii) LUS, and iii) LMP in hectares and % of total project area. In each case, it is required that the areas under the different land covers and LUS each add up to 100% of the project area. The Worksheet should be submitted together with maps of the different classes, each clearly dated and labelled in English.

[5] See: www.glcf.umd.edu, www.glcn.org, and www.gofc-gold.uni-jena.de/sites/globcover.php.

Indicator II: Land Productivity

Land productivity changes reflect Impact on Ecosystem Services within the hybrid SLM framework, with a focus on provisioning services. Land degradation is manifested as a reduction in land productivity. However, as productivity may be measured through a wide range of context-dependent methods and metrics, it is rarely monitored comprehensively at present. The three sub-indicators in Table 5 provide a basic means to quantify impacts on productivity achieved through SLM in different LUS, capturing and valuing a diversity of products, and accounting for the likely effects of variation in inputs.

Table 5. Indicator Definitions and Guidance related to Productivity

Project Indicators	Units	Sources and Methods for Measurement
Annual Agri- and Silvo-cultural Production (crops, livestock, forests)	1) Cropland (Crops): t/ha 2) Grazing land (meat and milk): t/ha and l/ha 3) Forest (woody biomass): t/ha	1) Remote sensing and field validation of NPP (NDVI corrected) 2) National agricultural statistics 3) Project implementation databases 4) Land user information collected through project workshops, participatory assessments, trainings 5) Local market surveys 6) Household surveys 7) AQUASTAT online information system
Diversity of Crop Species (in productive use)	1) Number of varieties 2) % of total production	
Change in Productivity (per unit input)	1) Water inputs (m^3/ha) 2) Other biophysical inputs (t/ha)	

Annual Agri- and Silvo-cultural Production (crops, livestock, forests)

As indicated above, the products to be measured are crops (tons per ha) in the different cropping systems, livestock products of meat and milk (tons and litres per ha, respectively) in the areas under grazing, and woody biomass (tons per ha) in all forest and pasture LUS. For reporting of this indicator to be collated at the global level, it requires generalization within the land use and management classes. This would usually be done on the basis of averages. Sampling strategies to generate the necessary average values should be presented and costed in the project document, involving land users whenever possible. The required indicators will mask a complex range of levels of productivity within and between plots of land. Projects and their stakeholders may independently decide to further analyse these ranges and variations, but they will not be routinely required to report a greater level of detail through the global indicator system.

Regarding the measurement of woody biomass using the Normalized Difference Vegetation Index (NDVI), relevant techniques have been demonstrated by many recent studies (see Bai and Dent, 2006 and Vogt *et al.*, 2009). Since these techniques continue to evolve, project teams are advised to consult the recent scientific literature, engage with local universities for the preparation of data, and also to consider publication of practical experiences in using these tools in order to benefit other users. Effectively combining field observation with remote sensing (for example, for the observation of woody biomass in forest areas or dry matter in pasture areas) is particularly important as a means to ensure the quality of the estimates. In this regard, land users and project beneficiaries are in a position to make an important contribution to activities for field data collection and analysis.

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The assessment of livestock products can often be deduced from pasture carrying capacities, building on the vegetation assessments described above; ideally, these estimates should be combined with direct observations of livestock numbers by land users and/or project staff. Local and national statistics on forest and pasture production and livestock numbers, where available, are a third important source for triangulation of estimates. A full investigation of the availability of these statistics, along with all other relevant production statistics, would be required during the baseline data collection. Additional information on livestock products may also be obtained from marketing and commercial associations, for example, from abattoirs, dairies and livestock marketing boards.

Diversity of Crop Species

Regarding crop production, the combination of land user information and local or national agricultural statistics is advised. In the project planning phase, available statistics would provide the necessary estimates to be used for scenario-building. During project implementation, there are many opportunities to build and refine project databases from land users' observations concerning productivity of different crops and the use of water and other biophysical inputs (for example, through workshops, participatory assessments, trainings and other activities).

Cross-checking and comparison of project estimates against long-term national data collection, even where these are at a coarser scale, is an important means to both check project estimates, placing them in a broader context, and to highlight project achievements in demonstration areas. Even where projects are not located in responsible Agencies, the degree to which national statistics capture the diversity of production may still be useful. In some cases, projects may choose to undertake dedicated household surveys in order to obtain the necessary information. Other available supplementary methods include local market surveys.

Change in Productivity

For each land cover and land use system, a series of generic estimates regarding productivity of the major crop in tons and numbers of other crops should be prepared at the outset, and progressively updated during the project through a process similar to the one for locating the systems, as described in the previous section. Data on minor, perhaps high value, crops grown on small areas would be important if they contribute substantially to household/ farm income, and could be included in the worktables.

Points for Consideration

For each LMP, it will be necessary to track inputs of water and other biophysical inputs in order to assess productivity in terms of tons per unit of water and other inputs. Ideally, this information will be available from national agricultural statistics or land users; for the latter, this information can be collected by projects at the same time as they obtain land users' accounts of livestock and crop productivity, as described above. If such information is not available from land users or is difficult to obtain, projects can consult the AQUASTAT information system on water and agriculture[1] for available data on water use in production systems.

[1] Available online at: www.fao.org/nr/water/aquastat/main/index.stm

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Indicator III: Water Availability

Water availability fits within both the Pressure and Impacts on Ecosystem Services categories of the SLM framework. The impacts on the availability of water resources through SLM interventions are critical, but monitoring of these impacts is rare and often considered both conceptually and methodologically challenging by SLM project teams. In order to meet this challenge, SLM project teams will need to combine information from sources that are routinely available to them in the project area (e.g. water used per farm) with strategic information that may be generated and held elsewhere by other institutions (e.g. water available from reservoirs).

Table 6. Indicator Definitions and Guidance related to Water Availability

Project indicators	Units	Sources and Methods for Measurement
Available Water Resources	1) Volumetric measure (m^3)	1) National and local hydrological and meteorological statistics 2) National water resources planning and sectoral water use projections 3) Agricultural services and irrigation providers 4) Industrial and domestic water providers 5) National and local progress reports on household access to safe water 6) Project activities and project databases 7) Direct surveys of water users 8) Field measurements, where gaps exist in available data 9) AQUASTAT online information system
Extraction of Water Resources	1) Volumetric measure (m^3)	
Water Balance (available water resources divided by extraction of water resources)	1) %	

Available Water Resources

Nationally-established estimates should be used to assess water availability. The project team will need to identify the availability of water resources in the project area using the appropriate hydrological units, which may include one or more watersheds, basins or sub-basins. Meteorological information, as described below (see inset on Points for Consideration in this section), is an important component of water availability and usually the most significant water input in non-irrigated systems.

In addition to these, the project team will need to identify and track flows of water through the project area in both surface and sub-surface water bodies. Where reserves of non-renewable groundwater exist, these would not normally be considered 'available' and therefore should not be included in the measurement. In some cases, it may be desirable to supplement existing national water resources assessments with data available from local sources in order to refine the availability of data in the project area. This is a strategic choice for each project to consider in consultation with its stakeholders.

Water Extraction

Water extraction is rarely measured directly and therefore can be estimated by water use. In SLM projects, information on water use per hectare in irrigated systems can usually be obtained either from information on the design of the irrigation infrastructure or from estimates used by local agricultural services. Water uses for livestock can often be estimated on a per head basis, using estimates based on livestock numbers obtained through the approaches described under the section on Annual Agri- and Silvo-cultural Production.

The section on Land Productivity and its corresponding Worksheet 2 describe the estimation of inputs to production, including water, based on nationally available generic values for the computation of the baseline or data available from AQUASTAT, and the refinement of these estimates during the project through use of land user information. Based on the estimates of water input under each LMP (Worksheet 2, Worktables P3), it will be possible to extrapolate values for water use in each LUS and to multiply these figures by the total area in each LUS in order to produce a figure for total agricultural water use by LUS (Worksheet 3, Worktable W2); these figures can be summed to produce total agricultural water use in the project area (Worksheet 3, Worktable W1). Therefore, when using Worksheet 3, projects will need to begin by first completing the figures in Worktables W3 in order to proceed to calculating the figures for Worktable W2. These in turn can be used to calculate the total agricultural water resources in Worktable W1.

In order to obtain an assessment of total water extraction in the project area (Worktable W1), estimates of non-agricultural water uses (domestic and industrial) will also be required in addition to those generated for agricultural systems. Projects can consult national assessment programmes, particularly those addressing the water-related MDGs, for information on the volumes of water used by households in the project area. Data from this source would be examined during the compilation of the baseline during the project preparation and inception phases.

Water Balance

Once projects have obtained the data on total available water resources and total extraction of water resources in the project area through Worksheet W3, a simple calculation (total water resources / extraction of water resources) is needed to arrive at the figure for the total water balance in the project area (to be entered in Worktable W1 on Worksheet 3).

Points for Consideration

The water availability indicators and accompanying Worksheet have intentionally been simplified and do not necessarily require projects to address such questions as volumes of water used by vegetation in evapo-transpiration, run-off patterns under different land uses, etc., or indeed, do not necessarily require projects to undertake field measurements of any kind unless the project team and stakeholders decide that this is needed following their review of the baseline data. The requirement for the reporting of the global impact indicator on water availability consists of the best available assessment of the water balance in the project area. However, some projects may choose to progress from their calculation of this indicator towards more sophisticated approaches to hydrological modelling, making further use of the datasets and GIS tools that will already be created through their project.

Often, SLM project offices do not have in-house capacity to plan and manage extensive water resources monitoring programmes. In these cases, the most effective means to address these issues, and in some cases also to fill gaps in information on water use, would be through coordination with the local hydrological and meteorological services in order to maximize the use of available knowledge regarding applicable methods for data collection and analysis. It is important to bear in mind that in many countries, existing hydrological services face limitations regarding manpower for field data collection. SLM projects have a comparative advantage for the implementation of participatory water resources monitoring activities through their outreach activities with land and water users. Combining and coordinating these available capacities may provide an efficient means to effectively supplement existing hydrological data availability and to contribute to national hydrological databases.

Finally, a key reference point in determining water use and water availability in the project area will be national water resources planning assessments and national and local climate change adaptation strategies, supplemented by the local information base. The time frames within which changes to water availability and use can be expected should be guided by these strategies. In the case of this indicator on water availability, the national target is likely to refer to a longer time frame than the project duration. The preparation of national strategies usually entails a review and synthesis of the best available information on present and predicted water demand at the national level. Following the consultation of these sources, it is likely that further refinements to the available datasets will be needed in order to fit the assessment to the scale of the project area.

Indicator IV: Human Well-being

Anticipated impacts on human well-being are essential to the justification for SLM activities at all scales, from the individual to the global. A more compelling use of indicators capturing impacts achieved on poverty through SLM projects is considered essential to supporting the mainstreaming of SLM. However, well-being is accepted to have many different dimensions (health, security, cultural, educational, spiritual, etc.) and should be reflected by more than just economic indicators[6]; multi-dimensional indicators of human well-being have therefore been included in tracking impacts from SLM (see Table 7). These include the percentage of the rural population below the national poverty line, child malnutrition rates, and maternal mortality rates, which also coincide with indicators of human well-being routinely assessed under the MDGs.

Human well-being and poverty reduction indicators form their own category within the SLM framework, reflecting the importance of impacts on human well-being from SLM activities.

Projects should undertake an assessment of available information on these indicators in the study area at the outset of the preparation stage through the baseline review in order to strengthen a project's strategy for the achievement and tracking of improvements in human well-being.

Table 7. Indicator Definitions and Guidance related to Human Well-being

Project indicators	Units	Sources and Methods for Measurement
Rural Population below the National Poverty Datum/Line	1) % of rural population in the project area below the national poverty datum 2) $US/ha generated in each LUS 3) % of household basic needs (poverty line measure) generated on average land holding in target group	1) National statistics (e.g. LSMS, census, MDG reporting) 2) Project databases 3) Rapid appraisal and data collection through ongoing project activities (workshops, trainings, project surveys) 4) Local administrative databases on land holdings, land use rights, population and household structure 5) Dedicated household and farm budget surveys
Maternal Mortality Ratio	1) # of deaths per 1,000 live births	1) National data compiled for MDG reporting 2) Consultation of data from local medical services centers 3) Household surveys 4) UNICEF's State of the World's Children reports (available every 5 years)
Proportion of Chronically Undernourished Children under the Age of 5 in Rural Areas	1) % of total children under the age of 5 who are malnourished	1) National data compiled for MDG reporting 2) Project assessments such as household surveys and interviews 3) Consultation of data from local medical services centers

Rural Population below the National Poverty Line

Current accepted national methods for definition of the national poverty line are published by country governments in national reporting on poverty and the MDGs. Definitions usually refer to a calculation of the cost of household basic needs (e.g. a basket of food and other essentials). In some cases, other requirements, such as access to basic services, are built into the definition of the national poverty line. The accepted definition(s) of the poverty line(s) vary from one country to another and can change over time, according to the political situation. Projects should refer to the current accepted country definition of the poverty line according to national statistics when considering this indicator (see inset Points for Consideration in this section).

[6] This view was expressed during the Expert consultation process of the KM:Land project when selecting appropriate indicators for SLM activities.

Initially, at the time of project preparation, nationally available baseline data would enable projects to complete Worktables H1 on Worksheet 4 and to estimate values for Worktable H3. The quality of available estimates for Worktables H4 might be relatively low at this stage. These would likely be based partially or entirely on national datasets. However, through project implementation, estimates of income in the target areas (Worktables H4) would be improved; this is described further below. These improvements could then feed into the revision and improvement of estimates and values used in Worktables H3 and H1.

For the refinement of the values in Worktables H4, information from the SLM impact indicator databases described above on Productivity could be used as a starting point, as they provide data on production and inputs per hectare. This information can be used to project income per hectare under different LUS and LMP scenarios anticipated to result from project implementation, and enable the completion of Worktables H4. In order to refine estimates of income per hectare, the use of conventional farm budget calculation approaches can be used (described in detail by Desertlinks, 2009[7]).

For target groups of land users engaged in project activities, more accurate income assessments can be built into project activities, including workshops, training and project survey activities. These assessments should enable an understanding of the land holdings and land use activities of households, and the extent to which land-based activities produce income and in-kind products to meet their basic needs. A first point of reference for the design of such activities should be local databases on population numbers, household composition and land holdings in order to identify the coverage of project activities in relation to the overall profile and activities of local households.

In order to relate the actual land holding structure and livelihoods of households in the project area (Worktables H4) to the potential per hectare income generation (Worktable H3), project teams will need to use a range of available data sources and methods for analysis. The range and variation in values may also warrant more detailed analysis; however, no specific requirements for more detailed investigations are set. At the very least, it is recommended that a summary average figure be reported (Worktables H4), together with the accompanying data profiles.

Further possible uses of datasets may be considered and guided by the project stakeholders, depending on their interest. Stakeholders and Agencies may, for example, decide to require reported information to be broken down into different categories for further analysis of factors relating to gender or ethnic group, building on the common global requirement for basic reporting of the indicators, as shown in Worksheet 4.

Maternal Mortality Ratio and Proportion of Chronically Undernourished Children under the Age of 5 in Rural Areas

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The indicators on maternal mortality ratio and proportion of chronically undernourished children under the age of 5 in rural areas should both be reported at the start and end of the project. These indicators would be measured using the best available national and local datasets.

Following the baseline assessment and development of impact scenarios during the project preparation and inception phases, a decision should be made by those reviewing the project as to whether a project would be likely to influence these indicators. If it is determined that a project would be likely to have impacts on these two indicators, then these should be built into the logframe of a project for regular reporting throughout a project's implementation. These decisions should be made on a project by project basis by the responsible Agency in consultation with GEF STAP and all stakeholders.

[7]Please refer to http://www.kcl.ac.uk/projects/desertlinks/accessdis4me.htm for further information.

Points for Consideration

Following the KM:Land pilot testing exercise of the global indicator set, it was found that the human well-being indicators were the most challenging for projects to relate to the effects of SLM interventions. The sub-indicator relating to the rural population below the national poverty line was proved through the pilot testing to be highly effective and relatable to SLM, and is therefore included as mandatory for reporting for all SLM projects. The sub-indicators on maternal mortality and proportion of chronically undernourished children, however, remain for the moment optional, given the challenges in attributing impacts from SLM activities to these aspects of human well-being.

Regarding the use of national statistics on poverty, because methods used for the calculation of national poverty lines are set through political consultation processes in each country, both the validity and the strategic advocacy value of using these nationally recognized and negotiated measures of human well-being is high. Projects are therefore recommended to refer to them wherever possible, and to use nationally validated datasets concerning poverty levels in the project area, where available. Sometimes this will mean working with a changing national definition of the poverty line and retrofitting data to adjusted definitions during a project's lifetime. Project teams should be prepared for this challenge.

In some cases, projects may propose household or farm surveys to generate further systematic information on household income generation from SLM. In these cases, it is recommended that the sampling frames and data collection should refer to, and if necessary, further interrogate, national standard procedures for poverty assessment. Since such surveys can be costly to design, implement and analyse, it is highly recommended to prioritize effective generation and maintenance of project databases and effective documentation of participatory assessments with project stakeholders before proceeding.

Projects will further need to address the challenge of connecting available national statistics on poverty levels to the geographical limits of the study area (Worktable H1). In some cases, a project's boundaries may not correspond to the administrative definitions used in published national poverty assessments. Sometimes, upon request, national statistical authorities can produce the findings of past poverty surveys to smaller administrative subdivisions at no additional cost. This possibility should be fully investigated through appropriate channels before the project proceeds to design any independent supplementary data collection.

Since the household income generation from SLM to be reported in Worktables H4 refers to the average income generated in an average-sized land holding in the land management area, the methods for identification of these averaged values will be up to the project to determine and document through discussion with project stakeholders.

The effective use and review of the data profiles to be developed for each dataset used for the poverty indicator will be essential to ensure credibility. These will provide important tools for periodic review and improvement of methods within the project, and through presentation and discussion of progress with stakeholders. This is true for all of the indicators, but especially for the poverty-related indicators in order to effectively highlight the benefits of SLM.

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7 Collation and Analysis of Project-level Reporting on Indicators

The Worksheets, together with the data profiles presented in Section 5, are intended for the reporting of changes measurable in each of the impact indicators by GEF LD FA projects. They provide a first step in reporting on the indicators. In addition to these, projects are asked to undertake an analysis of their data and compile a report on their findings. The following provides some guidelines for presenting the information on the indicators.

Presentation and Interpretation of Indicators

Indicators should be presented so as to engage the audience. Indicator reporting should use a variety of methods for conveying the information, including written commentary and visual formats such as maps, graphs, diagrammes and statistical tables. The numerical values of indicators may be presented in tables for ease of use. Where appropriate, an explanatory paragraph should be added to support the understanding of indicator values. Wherever possible, the original source of data and information should be provided, preferably together with references to the relevant website(s), if available. If data are collected by another organization, the source should be properly acknowledged.

In addition to reporting on each indicator, a discussion based on all indicators and also linkages between different indicators should follow. As far as possible, the commentary and presentation should remain objective. When comparisons are to be made between different SLM projects in the same area, care must be taken to ensure that the indicators are calculated using the same procedure and are based on data that have consistent concepts, definitions and counting units, and are collected using the same data collection methods. Furthermore, care should be taken to ensure that the information is described in its context.

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Any factors influencing the direction or rate of change of an indicator should be discussed, as well as any known reasons for changes in the value of an indicator (the direction or rate of growth). Contextual information should be provided to assist the reader to interpret the indicators. Care should be given when interpreting subjective indicators as they are particularly difficult to measure (especially changes over time). There should be a periodic review of the indicators to take into account any changes in the project area.

A number of guidelines exist which can provide lessons learned, good practices, recommendations and useful references on interpretation and reporting of the indicators (see Advisory Committee on Official Statistics {ACOS}, 2009). The following are some additional points for consideration when reporting on indicators:

- Data reported against SLM indicators may be quantitative or qualitative, making aggregation of different elements difficult to combine. In such instances, the project should work with appropriate partners or discipline experts to interpret the data and aggregate it to the next level. Quality is best measured by the outcomes or impacts on the resources (measured by site investigation, monitoring, inventory, use of models, etc.) and not by forcing a unit of measurement that is inappropriate for a particular resource issue or where the expertise is not available to measure.

- Some indicators are subject to short-term volatility, while others change very slowly. In circumstances where indicators are volatile from year to year, thought should be given to using a moving average.

- It is important to determine what the reporting indicators really indicate. The goal should not be to simply

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describe and define the indicators; indicators should be probed for their implication and intent. Such information can assist policy-makers in devising reporting systems that can better demonstrate accountability, improve performance and respond to the needs of the project area.

- Indicator reporting must include a process for stakeholder dialogue that builds upon a shared understanding of the different stakeholders' concerns, allowing for an appropriate balance of site-specific and generic indicators.

- Indicator values should be presented in aggregated form as much as possible. When an indicator relates to the state (quality) of the land and/or local environment, and is composed of a large number of entries of different importance (e.g. many surveillance profiles of different importance to measure the water quality of local rivers), a semi-aggregated or even disaggregated presentation is recommended, depending on the number of items. In such cases, presentation in the form of a map is strongly recommended.

- Where different sources of data exist, the best available estimate should be used. Information on the sample size, the quality and reliability of the data, and any related issues should be included. The sampling and non-sampling errors should be calculated when an indicator is derived from sample survey data (also when considering the suitability of an indicator).

Project-level Review of Impacts Achieved

The collection and review of this information at the project level by the project team and stakeholders will show where changes could be observed in the targeted indicators, and where they could not. The transparent review and discussion of this information is necessary in order to enable project teams and stakeholders to consider how the observed changes should be interpreted for the ongoing improvement of SLM activities implemented by the project. In some cases, changes to the measurement methods and approaches within the project may be needed in order to more effectively capture relevant impacts. In others, adaptive management and changes to activities under implementation may be required.

Following the internal review and discussion of the impacts of the SLM activities amongst the project team and its immediate stakeholders, the publication of the reporting on the impact indicators to a wider audience of stakeholders, particularly at the national level, is recommended. The impact indicators are designed to be of interest to an extended group of stakeholders across different sectors and scales of administration. Publication of the project results should therefore engage a national-level discussion of opportunities to further mainstream SLM activities.

Portfolio-level Collation and Review

In terms of collation of information at the portfolio level, it is the responsibility of a project's Implementing and Executing Agencies to collect and collate information reported from projects through the annual Project Implementation Reviews (PIRs) or other GEF reporting format (e.g. PMAT), Mid-Term and Final Evaluations. The data collected by projects on these indicators will be essential for them to do so. This information is in turn transferred to the GEF for collation at the portfolio level.

The regular collation and critical review of the information collected on the impact indicators at the portfolio level will be necessary in order to obtain an assessment of the overall results achieved through the GEF LD portfolio, to analyze generic and transferable lessons from the results achieved, to determine any global environmental benefits, and also to consider the possible harmonization and improvement of data quality. These tasks may require additional capacity to be put in place in one of the responsible institutions, or to be outsourced to (an)other competent institution(s).

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A1 Appendix I. Contextual Indicators

During the process of developing a set of global impact indicators, it was recognized that a further set of contextual indicators is needed to account for external factors outside the control of the project. This contextual information will ensure that the indicators are corrected for external trends not related to a project's intervention, which is necessary in order to determine whether the observed changes in the project-level impact indicators can be attributed to the impact of the project itself and are not the result of general changes in the natural or human environment. The following contextual indicators have been selected for the impact assessment of GEF projects.

Table A1. Contextual Indicators

Contextual Indicator	Unit of Measurement	Sources and Methods for Measurement
Population Density	1) Population per km^2	1) National or local statistics (for population size) 2) National, local or project maps or surveys (for surface area data of project intervention area)
Extreme Natural Events (e.g. floods, droughts, fires, storms, etc.)	1) Number of bodies or persons 2) Economic damage or loss in terms of $US	1) Methodology from Centre for Research on the Epidemiology of Disaster 2) Data collected and validated at the project level in coordination with local-level government authorities
Extreme Non-natural Events (e.g. conflicts, in-/out-migration, civil unrest, market crises, etc.)	1) Number of persons or communities displaced, dead, missing, or migrated 2) Economic damage or loss in terms of $US	1) Methodology from Centre for Research on the Epidemiology of Disaster 2) Data collected and validated at the project level in coordination with local-level government authorities
Trends in Seasonal Precipitation	1) Departure from average in standard deviations (preferred) 2) Absolute value or departure from the average in mm (alternate)	1) Annual rainfall statistics available from various stations situated in the area 2) National meteorological/climate services 3) Remote sensing data
Market Prices	1) $US	1) Local and national reports, newspapers, economic publications 2) Project surveys at local markets

Population Density

Population density is a Pressure indicator, and has close linkages with other demographic indicators such as population growth rate, net migration rate, life expectancy at birth, total fertility rate, and human settlement. Higher population densities imply increased reliance on resources imports and export of goods, as well as environmental impacts such as solid waste disposal, water pollution and emissions to air and water.

Population density measures the concentration of the human population in reference to space, and is calculated as the total population size of an area (e.g. project intervention area) divided by its surface area. Surface area data represent the total surface area, comprising land area and inland waters (assumed to consist of major rivers and lakes). In practice, the definition differs among countries, but is sufficiently comparable for interpretation and analysis.

For the benefit of SLM projects, more refined indicators, such as number of persons per unit of habitable or cultivable land, may be more useful for analytic purposes.

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Extreme Natural Events

Extreme natural events, as part of this set of contextual indicators, fall within the Impact on Ecosystem Services and Impact on Human Well-being categories of the hybrid SLM framework. Extreme natural events include natural occurrences such as floods, droughts, fires and storms, and are linked with a number of other socio-economic, environmental, and institutional measures, such as population density, access to safe drinking water, population in informal and formal urban areas, development assistance, and land use in the project intervention area.

The impacts of extreme natural events is measured through estimates of the human and economic losses from disasters and emergencies over time and across project intervention areas, and is intended to provide an overview of trends in population vulnerability. This indicator is measured through the number of persons dead and missing as a direct result of a natural disaster and through the amount of economic and infrastructure losses incurred as a direct result of the natural disaster.

It is suggested that the methodology developed by the Centre for Research on the Epidemiology of Disaster (CRED) be used (CRED, 1994) in combination with data collected and validated at the project level in coordination with local-level government authorities using the CRED standard criteria and methods. The general methodology includes the onset date (the date when the disaster situation occurred), declaration date (the date when the first call for external assistance concerning the disaster is issued), disaster type (describes the disaster according to a pre-defined classification scheme), number of dead (persons confirmed dead, and persons missing and presumed dead), and estimated amount of damage (the value of all damages and economic losses directly related to the occurrence of the given disaster).

Extreme Non-natural Events

Along with natural extreme events, non-natural extreme events fall within the Impact on Ecosystem Services and Impact on Human Well-being categories of the SLM framework. Events such as violent conflicts, in-/out-migration, civil unrest and market crises affect the lives of a great number of people, especially in developing or unstable countries. The impact is often dramatic and disproportionally affects those that are already poor and marginalized, impacting their security, livelihoods, and future prospects. These events can also be linked to natural disasters such as earthquakes, floods, hurricanes and epidemics that increase the risk of violent conflict or unrest, migration and economic instability.

This indicator is measured through estimates of the human and economic losses over time and across project intervention areas from such events, and is intended to provide an overview of trends in population vulnerability. This indicator is measured by estimating the number of people affected (displaced, dead, missing, migrated) as a direct result of an event, and by estimating the amount of economic and infrastructure loss incurred as a direct result of non-natural social disasters. As with the indicator above, the methodology developed by CRED (for estimating impacts of natural disasters) can be used to measure human and economic impacts of non-natural disasters.

Trends in Seasonal Precipitation

Lack of precipitation, irregular rainfall distribution, non-seasonal rains, etc. are the main climatic factors contributing to land degradation and affecting agricultural productivity. As such, it is categorized as a Pressure indicator in the SLM framework. This indicator is closely related to other social, economic and environmental measures important to drylands, including population growth rate, net migration rate, human and economic loss due to natural disasters, gross domestic product (GDP) per capita, land use change, land affected by desertification, and arable land per capita.

Trends in seasonal precipitation are important for determining the average rainfall water availability in project areas (or regions) subject to drought. It is measured through the national average of monthly station rainfall (or average for the project area, if possible) weighted by the long-term station rainfall average. Annual rainfall statistics should be available from various stations situated in the project area, or alternately, from national meteorological/climate services complemented with remote sensing data. The data should be based on a time series spanning at least 30 years, which is necessary for providing an indication of the trend/development of the rainfall pattern in the area.

Market Prices

Market prices for key agricultural inputs and outputs can strongly influence agricultural production and other indicators such as human well-being. Depending on the area and the level, market orientation of the stakeholders' local, national or even global market prices may influence their production, thus producing a direct Pressure on the land.

An analysis of market prices can help to identify trends about the level of productivity within a given area. Local, national and global prices for key agricultural inputs and outputs should be assessed, and data can be collected through newspapers, local and national reports, economic publications, etc. Alternately, local market prices can be assessed by the project directly onsite at local markets.

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Appendix II.
Development of an SLM Framework

A2

The use of indicators or sets of indicators that attempt to handle complex phenomena, such as land degradation, needs to ensure that all aspects of the problem have been represented. It is widely recognized that land degradation cannot be addressed in terms of single measures (e.g. see Reynolds *et al.*, 2011); it requires a variety of interactions which take into account the biophysical processes, climatic variations, human activities and socio-economic conditions that are dependent on each other. Currently, impacts are often measured separately for human and natural sub-systems, without integration of the biophysical and socio-economic components; however, separation of biophysical and socio-economic factors is artificial, and only shows half the picture of the problem.

One way to understand how these varied factors interact is through the development and use of a conceptual framework or model. Conceptual frameworks help to show a logic to the selection of indicators and should:

- Identify key variables;
- Distinguish between observable and quantifiable factors vs. driving and controlling variables of land degradation;
- Group similar indicators together under components of a framework;
- Distinguish between indicators representing different types of variables, e.g. states and rates;
- Reveal interconnections between variables and indicators;
- Reduce subjectivity in indicator selection; and,
- Contribute to the ability to synthesize information from indicators in order to present an integrated picture of land degradation.

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With this background in mind, the KM:Land project developed a hybrid SLM framework as a way to combine the focus on ecosystem services and human well-being from the Millennium Ecosystem Assessment (MA, 2005) with the biophysical processes and drivers of the Driver-Pressure-State-Impact-Response (DPSIR) framework (Smeets & Weterings, 1999). While the DPSIR framework describes the causal chain from human and natural driving forces to impacts on ecosystems and political responses, the MA presents a model that emphasizes the link between environmental services and human well-being (MA, 2005). At the core of the SLM framework is the recognition that it must integrate both the biophysical and socio-economic factors as well as the range of temporal and spatial scales of land degradation.

Figure A1 shows how these two frameworks mainly overlap at the levels of Drivers, Driving Force and Pressure. Connections between Ecosystem Services and Impact are made via the concept of Ecosystem Functions as many individual functions of ecosystems, such as primary productivity, water regulation, climate regulation, and aesthetic, cultural and spiritual values, etc., act together to provide the host of major ecosystem services.

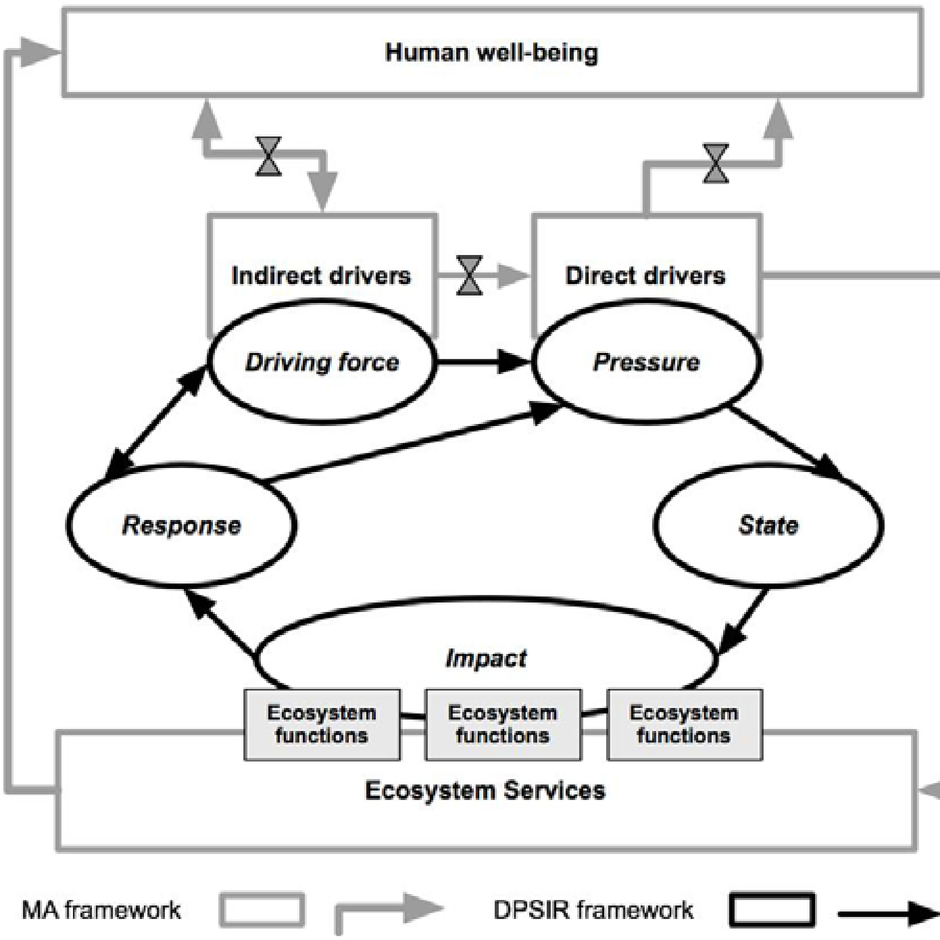

Figure A1. The Relation between the DPSIR and MA Frameworks.

Figure A2 shows the proposed integrated framework as a basis for the monitoring and assessment of the global impacts of SLM interventions, which at the same time allows for the analysis of the drivers underlying land degradation processes. By combining these two frameworks, it emphasizes the need for improving human well-being, which is in fact the primary purpose of SLM approaches for development. In addition, measuring and understanding ecosystem services provides the basis for better adaptive management of SLM and helps to quantify and raise awareness of the value of ecosystem services to society. Thus, the new SLM framework attempts to cover the physical, ecological and human dimensions of socio-ecological systems as demanded by holistic approaches to natural resources management.

The Response category of the hybrid framework represents a wide range of responses to the challenges of land degradation. Responses can either be direct through introducing and promoting SLM practices, or indirect through creating an enabling policy environment for SLM, strengthening human, technical and institutional capacity to support SLM, integrating SLM in relevant planning and policy frameworks, improving SLM knowledge management, and developing financial mechanisms for SLM. For example, the development of legislation that defines user rights with regards to the protection of natural resources can help to ensure that local people and communities or economic sectors that depend on the land resources manage components of the biophysical sub-system (soil, vegetation and water) in a sustainable way. Figure A2 also distinguishes responses in terms of Prevention, Mitigation and Adaptation, and shows how these reflect feedbacks on Driving Force, Pressure, State and Impact.

While the above-described responses are ultimately expected to have an impact on the Ecosystem Services and Human Well-being components, the typical time frame of an intervention often prevents the measurement or observation of changes at this level. Therefore, the State category is important as it can be used as a proxy for changes in ecosystem services and subsequently human well-being that we can expect to happen over a longer time frame.

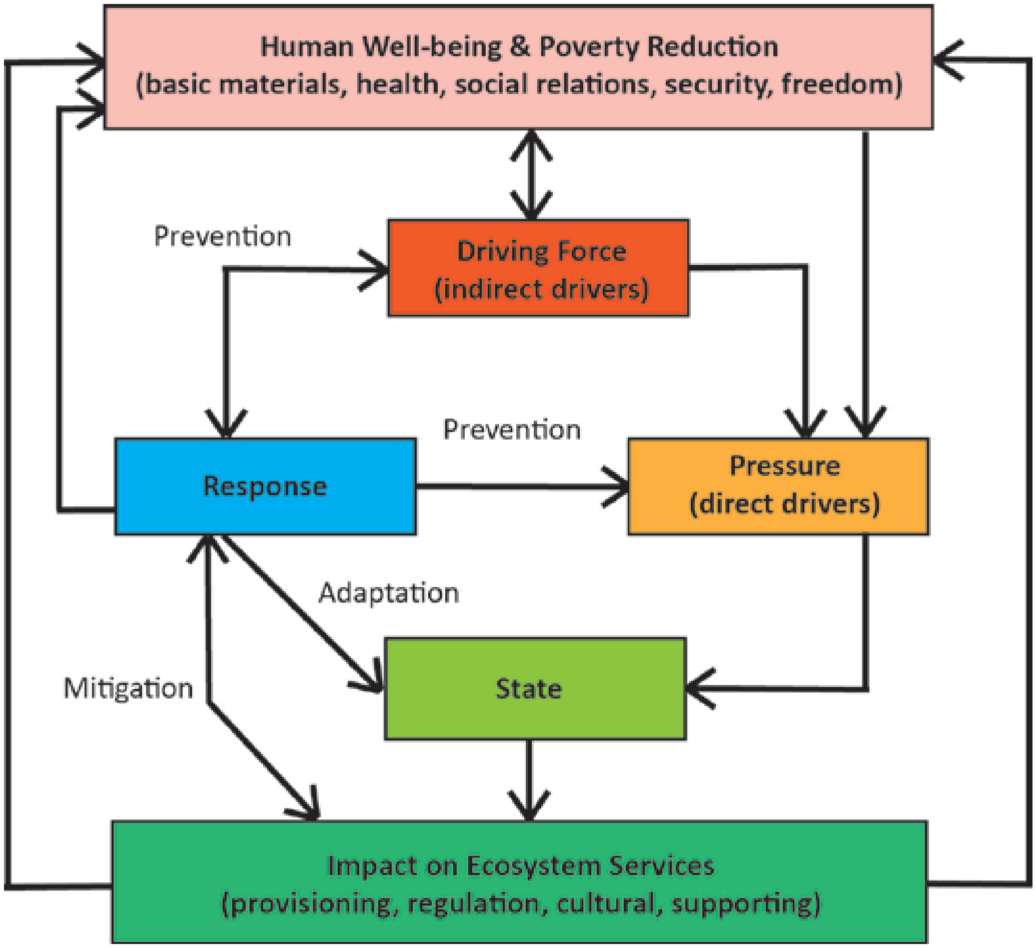

Figure A2. Hybrid SLM Framework for Monitoring and Assessing Impacts from SLM Interventions.

The Ecosystem Services and Human Well-being components of the hybrid framework provide a means to express the impacts of SLM at both ecosystem and human levels. Impacts are generated at all spatial scales, including the local, regional and even global levels. At the local level, impacts of SLM are expected to result in preserving and enhancing locally-relevant ecosystem services, such as soil development, nutrient recycling, maintenance of primary productivity, soil carbon sequestration, water regulation and maintenance of biodiversity. This has positive effects on local food security and livelihoods dependent on ecosystem services, but also leads to benefits at the national level. At the national level, reducing rural poverty levels, ensuring national food security, contributions to the GDP by the agricultural and forestry sectors, mitigating large-scale effects of degradation (e.g. dust storms), provision of a sufficient and safe water supply, and reducing greenhouse gas emissions form priorities. Even at the global level it has been widely accepted that SLM can generate benefits beyond the immediate local and national impacts, including the maintenance of globally important agro- and forest-ecosystem services, reducing the loss of global biodiversity, mitigating climate change through reduced deforestation and reduced greenhouse emissions from agriculture, as well as the protection of international waters.

The multiplicity of expected benefits to the Ecosystem Services and Human Well-being components at all spatial scales introduces challenges for the selection of indicators that i) adequately represent trends in combating land degradation, ii) are meaningful to the target audiences at the local and global levels, and iii) can be assessed in a cost-efficient way. The use of the hybrid SLM framework developed under the KM:Land project provides one option for addressing these challenges, and provided the basis for selecting the suite of global indicators and their corresponding sub-indicators at the project level.

Worksheet 1: Land Cover, Land Use Systems and Land Management Practices

Phase (select one): ☐ Preparation ☐ Inception ☐ Mid-term ☐ End-of-project
Date: ______________________

Worktable L1: Reporting Land Cover in the Project Area

LAND COVER	FOREST		PASTURE		CROPLAND		BUILT		BARE		WATER		TOTAL	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Baseline (yr)														100
Target (yr)														100
Present (yr)														100

ha = hectares
% = % of total area

Worktable L2: Reporting Land Use Systems in the Project Area

LAND USE SYSTEMS	FOREST				PASTURE				CROPLAND				TOTAL	
	(LUS)		(LUS)		(LUS)		(LUS)		(LUS)		(LUS)			
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Baseline (yr)														
Target (yr)														
Present (yr)														

ha = hectares
% = % of total area

Worktables L3: Reporting Land Management Practices in the Project Area

FOREST							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Forest Reserve		ha	%	ha	%	ha	%
E.g. Agro-forestry							

PASTURE							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		ha	%	ha	%	ha	%
E.g. Silvo-pastoral							

CROPLAND							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		ha	%	ha	%	ha	%
E.g. Silvo-pastoral							

ha = hectares
% = % of total area

Worksheet 2: Land Productivity

Phase (select one): ☐ Preparation ☐ Inception ☐ Mid-term ☐ End-of-project

Date: ____________________

Worktable P1: Reporting Productivity in Land Cover Systems in the Project Area

LAND COVER	FOREST		PASTURE		CROPLAND	
	T/ha	#/%	T/ha	#/%	T/ha	#/%
Baseline (yr)						
Target (yr)						
Present (yr)						

T/ha = tons per hectare (major crop)
= number of species; % = major crop as % of total production

Worktable P2: Reporting Productivity in Land Use Systems in the Project Area

LAND USE SYSTEMS	FOREST				PASTURE				CROPLAND				TOTAL	
	(LUS)		(LUS)		(LUS)		(LUS)		(LUS)		(LUS)			
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Baseline (yr)														
Target (yr)														
Present (yr)														

T/ha = tons / hectare (major crop)
= number of species; % = major crop as % of total production

Worktable P3: Reporting Productivity in Forest Land Use Systems

LUS: **Forest**	LUS						LUS					
Management	Practice			Practice			Practice			Practice		
	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%
Baseline (yr)												
Target (yr)												
Present (yr)												

T/t = tons of crop per tons of input (major crop)

T/m³ = tons of crop per cubic meter of water (major crop)

= number of species; % = major crop as % of total production

Worktable P3: Reporting Productivity in Pasture Land Use Systems

LUS: **Pasture**	LUS						LUS					
Management	Practice			Practice			Practice			Practice		
	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%
Baseline (yr)												
Target (yr)												
Present (yr)												

T/t = tons of crop per tons of input (major crop)

T/m³ = tons of crop per cubic meter of water (major crop)

= number of species; % = major crop as % of total production

Worktable P3: Reporting Productivity in Cropped Land Use Systems

LUS: **Cropland**	LUS						LUS					
Management	Practice			Practice			Practice			Practice		
	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%	T/t	T/m³	#/%
Baseline (yr)												
Target (yr)												
Present (yr)												

T/t = tons of crop per tons of input (major crop)

T/m³ = tons of crop per cubic meter of water (major crop)

= number of species; % = major crop as % of total production

Worksheet 3: Water Availability

Phase (select one): ☐ Preparation ☐ Inception ☐ Mid-term ☐ End-of-project

Date: ______________________

Worktable W1: Reporting Water Availability, Water Extraction and Total Water Balance in the Project Area

	Available (m^3)				Used (m^3)				Balance (%)
	Rainfall (mm)	Surface flows (m^3/s)	Total Groundwater Recharge (m^3)	Total (m^3)	Agricultural*	Domestic	Industrial	Total	
Baseline (yr)									
Target (yr)									
Present (yr)									

*The total volume of water used in agriculture can be calculated from the Worktables below

Worktable W2: Reporting Annual Water Use by Land Use Systems in the Project Area (m^3/yr)

	FOREST				PASTURE				CROPLAND			
	(LUS)		(LUS)		(LUS)		(LUS)		(LUS)		(LUS)	
	Practice	Practice	Practice	Practice	Practice	Practice	Practice	Practice	Practice	Practice	Practice	Practice
Baseline (yr)												
Target (yr)												
Present (yr)												

*The total volume of water used in each LMP area is calculated by multiplying the volume per hectare from Worktable 3 below by the total area of each LUS

Worktables W3: Reporting Water Use in Land Management Practices in the Project Area

FOREST							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Forest Reserve		ha	m^3/ha	ha	m^3/ha	ha	m^3/ha
E.g. Agro-forestry							

PASTURE							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		ha	m^3/ha	ha	m^3/ha	ha	m^3/ha
E.g. Silvo-pastoral							

CROPLAND							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		ha	m^3/ha	ha	m^3/ha	ha	m^3/ha
E.g. Silvo-pastoral							

ha = hectares under land management practice

m^3/ha = volume of water used per hectare, in cubic meters

Worksheet 4: Human Well-being

Phase (select one): ☐ Preparation ☐ Inception ☐ Mid-term ☐ End-of-project

Date: ____________________

Worktable H1: Reporting Rural Poverty in the Project Area

RURAL POVERTY	Total rural population (#)	Total rural population (#) below national poverty line	% of rural population below national poverty line	% of total population below national poverty line
Baseline (yr)				
Target (yr)				
Present (yr)				

Worktable H2: Reporting Maternal Mortality Ratio and Proportion of Chronically Undernourished Children under the Age of 5 in the Project Area

MMR and UNDERNOURISHED CHILDREN	Total population (#)	# and % of women	# and % of children	# of deaths per 1,000 live births	% of malnourished children under 5
Baseline (yr)					
Target (yr)					
Present (yr)					

Worktable H3: Reporting Average Income Generation ($US/ha) in Land Use Systems in the Project Area*

INCOME	FOREST		PASTURE		CROPLAND	
	(LUS)	(LUS)	(LUS)	(LUS)	(LUS)	(LUS)
Baseline (yr)						
Target (yr)						
Present (yr)						

*Calculated from Production (see Worksheet 2, Worktables P2 and P3), multiplied by the local market value of the products

Worktables H4: Reporting Average Household Income Generation from Land Management Practices as a Percentage of Basic Needs (Poverty Line)

FOREST							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Forest Reserve		$	%	$	%	$	%
E.g. Agro-forestry							

PASTURE							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		$	%	$	%	$	%
E.g. Silvo-pastoral							

CROPLAND							
LUS	Practice	Baseline (yr)		Target (yr)		Present (yr)	
E.g. Game		$	%	$	%	$	%
E.g. Silvo-pastoral							

$ = average net contribution in $US to annual household income from an average-sized land holding under each LMP

% = ratio of $ (see above) to the cash poverty line, according to national definitions

Worksheet 5: Contextual Indicators

Phase (select one): ☐ Preparation ☐ Inception ☐ Mid-term ☐ End-of-project

Date: ____________________

Worktable C1: Reporting on Population Density in the Project Area

POPULATION DENSITY	Total population (# of persons)	Total surface area (km^2)	Population Density
Baseline (yr)			
Present (yr)			

Worktable C2: Reporting on Extreme Natural Events (floods, droughts, fires, storms, etc.) in the Project Area

NATURAL EVENTS	Event 1		Event 2		Event 3	
	# of persons	Economic loss ($US)	# of persons	Economic loss ($US)	# of persons	Economic loss ($US)
Baseline (yr)						
Present (yr)						

Worktable C3: Reporting on Extreme Non-natural events (conflicts, in-/out-migration, civil unrest, market crises, etc.) in the Project Area

NON-NATURAL EVENTS	Event 1		Event 2		Event 3	
	# of persons	Economic loss ($US)	# of persons	Economic loss ($US)	# of persons	Economic loss ($US)
Baseline (yr)						
Present (yr)						

Worktable C4: Reporting on Trends in Seasonal Precipitation in the Project Area

TRENDS IN SEASONAL PRECIPITATION	Project area (or national) average monthly station rainfall	Long-term station rainfall average	Average rainfall
Baseline (yr)			
Present (yr)			

Worktable C5: Reporting on Market Prices in the Project Area

MARKET PRICES	Key agricultural inputs and outputs					
	Key input 1 ($US)	Key input 2 ($US)	Key input 3 ($US)	Key output 1 ($US)	Key output 2 ($US)	Key output 3 ($US)
Baseline (yr)						
Present (yr)						

About KM:Land: The GEF-funded KM:Land project aims to lay the foundations for a comprehensive system to track progress across the GEF Land Degradation Focal Area (LD FA). The KM:Land project was initiated in 2007 and was designed to address the knowledge management gaps in the GEF LD FA by providing the scientific-technical basis for selecting indicators to demonstrate the benefits, impacts and good practices of SLM projects in the GEF portfolio. The KM:Land project is executed by UNU-INWEH in collaboration with UNDP as the implementing agency.
www.inweh.unu.edu/drylands/KMLand.htm

The United Nations University – Institute for Water, Environment and Health (UNU-INWEH) is a member of the United Nations University family of organizations. It was created by the UNU Governing Council in 1996 to strengthen water management capacity, particularly in developing countries, and to provide on-the-ground project support. Its core funding is provided by the Government of Canada and it is hosted by McMaster University, Canada.
www.inweh.unu.edu

The United Nations Development Programme (UNDP) is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. UNDP is on the ground in 166 countries, working with countries on their own solutions to global and national development challenges. As countries develop local capacity, they draw on the people of UNDP and its wide range of partners.
www.undp.org

The Global Environment Facility (GEF) unites 182 member governments in partnership with international institutions, civil society, and the private sector to provide grants to developing countries and countries with economies in transition, linking local, national, and global environmental challenges in order to promote sustainable futures for all. Established in 1991, the GEF is today the largest public funder of projects to improve the global environment, investing in over 2,700 projects.
www.thegef.org

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Available from:
United Nations University
Institute for Water, Environment and Health (UNU-INWEH)
175 Longwood Road South, Suite 204
Hamilton, Ontario L8P 0A1 CANADA
Web: www.inweh.unu.edu

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The KM:Land project, funded by the Global Environment Facility (GEF), aims to lay the foundations for a comprehensive system to track progress across the GEF Land Degradation Focal Area (LD FA). KM:Land was designed to address the knowledge management gaps in the GEF LD FA by providing the scientific-technical basis for selecting indicators to demonstrate the benefits, impacts and good practices of sustainable land management (SLM) projects in the GEF portfolio.

The measurement of results on the ground achieved through SLM is a necessary step towards creating the possibility for adaptive management and enhanced knowledge management, both within the targeted GEF-funded projects and beyond. The KM:Land project aimed to address these challenges through the selection of four globally-relevant indicators measureable at the project level. These guidelines are intended as a tool for project managers towards measuring impacts from SLM projects through this selected set of indicators.

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