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Convention to Combat Desertification

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Item 3 of the provisional agenda
Advice on how best to measure progress on strategic objectives 1, 2 and 3 of The Strategy

Refinement of the set of impact indicators on strategic objectives 1, 2 and 3. Recommendations of the ad hoc advisory group of technical experts

Note by the secretariat

Summary

By its decision 19/COP.10, the Conference of the Parties (COP) decided to establish an ad hoc advisory group of technical experts (AGTE), to be tasked with continuing the iterative participatory contribution from the scientific community, national focal points and Science and Technology Correspondents on impact indicator refinement and the monitoring and assessment of impacts.

This document contains the recommendations of the AGTE, which are accompanied by: (a) rationale statements that explain how the AGTE reached its conclusions; and (b) implementation guidelines which provide further advice on how the recommendations, if approved by the COP, can be put into practice by affected country Parties. The Committee on Science and Technology may wish to review and discuss these recommendations and subsequently make proposals to be adopted by the COP at its eleventh session.

Contents

List of abbreviations

AGTE	Ad hoc advisory group of technical experts
AGSA	Ad Hoc Working Group to Further Discuss the Options for the Provision of Scientific Advice Focusing on Desertification/Land Degradation and Drought Issues
AI	Aridity index
CBD	Convention on Biological Diversity
CDP	community development plan
COP	Conference of the Parties
CST	Committee on Science and Technology
DLDD	desertification/land degradation and drought
DPSIR	Driving Force-Pressure-State-Impact-Response framework
DPSheIR	Driving Force-Pressure-State-human and environmental Impact-Response framework
e-SMART	economic – Specific – Measurable – Achievable – Relevant –Time-bound
GDOS	Global Drylands Observation System
GEF	Global Environment Facility
GM	Global Mechanism
LADA	Land Degradation Assessment in Drylands
LUS	land use system
MA	Millennium Ecosystem Assessment
M&E	monitoring and evaluation
NAP	national action programme
NFP	national focal point
PET	potential evapotranspiration
PRAIS	performance review and assessment of implementation system
SKBP	Scientific Knowledge Brokering Portal
SLM	sustainable land management
SDUDP	system dynamics-based understanding of DLDD processes
STC	Science and Technology Correspondent
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WOCAT	World Overview of Conservation Approaches and Technologies

I. Introduction

A. Background and mandate

1. At its tenth session, the Conference of the Parties (COP) decided to establish an ad hoc advisory group of technical experts (AGTE) to be tasked with continuing the iterative participatory contribution from the scientific community, national focal points (NFPs) and Science and Technology Correspondents (STCs) on impact indicator refinement and the monitoring and assessment of impacts.

2. In accordance with decision 19/COP.10, the AGTE was tasked with addressing the following four fundamental issues:

(a) Identify the best scientific approach to operationally delineate affected areas, including an evaluation of how this delineation was undertaken during the pilot tracking exercise;

(b) Develop a mechanism or framework that encourages country Parties to identify nationally and locally relevant impact indicators and integrate these in their contribution to the global impact assessment effort;

(c) Further refine the set of the provisionally adopted impact indicators, based on national limitations, the findings of the scientific review and on lessons learned through applications by affected country Parties in the pilot tracking exercise and in the reporting process in 2012, to identify the most meaningful, globally applicable and cost-effective set of impact indicators;

(d) Develop a scientifically based approach for integrating, analysing and interpreting impact-indicator information, so that the overall set of impact indicators, when taken together, has the potential to generate at the national level relevant information that can be harmonized and used to produce regional and global baseline assessments.

3. Following a public call for experts, the AGTE was established through a selection process which was concluded at the meeting of the Bureau of the Committee on Science and Technology (CST) on 29–30 May 2012. The AGTE held its first meeting on 23–24 July 2012 and its second meeting on 21–22 January 2013 in Bonn, Germany, with financial support from the Governments of Spain and the Republic of Korea, under the Changwon Initiative. A progress report (contained in document ICCD/CST(S-3)/5) on the work undertaken by the AGTE was presented at the third special session of the CST (CST S-3), where the Chair of the AGTE and the members of the AGTE editorial team (see annex I to this document for a list of AGTE members) presented the preliminary recommendations of the AGTE. Following CST S-3, these preliminary recommendations were submitted to all NFPs, STCs and other stakeholders for comments. Feedback provided by Parties during CST S-3 and comments received during the following consultation period were taken into consideration by the AGTE in the formulation of its final recommendations.

4. This document contains the final recommendations of the AGTE. In accordance with the terms of reference for the AGTE,[1] the recommendations are accompanied by a peer-reviewed working paper (in progress), which constitutes the scientific evidence base for the recommendations and will be made available (in English only) on the UNCCD website prior to the eleventh session of the COP (COP 11).

[1] < http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Documents/TOR_AGTE_impact-indicators.pdf >.

5. The findings of the AGTE primarily build on a set of impact indicators provisionally accepted by the COP and on an indicator framework which were refined through an iterative scientific peer review process involving input from 104 technical experts between September 2010 and May 2011 (document ICCD/COP(10)/CST/2). The main findings of the iterative process related to the set of impact indicators and to the indicator framework are presented in annex II to this document. In addition, a glossary describing key terminology was developed by the AGTE and is provided in annex III.

B. General considerations

6. In parallel with the four main issues that the AGTE was tasked to address, certain observations can be made, as set out in paragraphs 7–13 below.

7. For the most part, measuring the impact of the implementation of the Convention against the strategic objectives of the 10-year strategic plan and framework to enhance the implementation of the Convention (2008–2018) (The Strategy) will require a different set of indicators (metrics/proxies) from those required to characterize the areas affected by desertification/land degradation and drought (DLDD) (Sommer et al., 2011).

8. The strategic objectives are conceptually broad enough to be considered multi-dimensional, thus requiring several indicators for assessing their degree of accomplishment.

9. However, in reality, it is impossible to fully meet the three strategic objectives at the same time, since they conflict with each other; when ecosystems approach maturity, their net primary productivity is used to maintain the turnover of their structures, and humans cannot produce anything without simplifying and degrading this structure, as illustrated by the history of agriculture and stock-breeding. This conflict calls for setting up some trade-off between strategic objectives. One of the issues that has, among others, to be dealt with in this respect is the emergence of a second trade-off: striking a balance between local versus global concerns in sustainable land management (SLM).

10. In order to track progress in meeting the strategic objectives, there is need for a consistent monitoring and evaluation (M&E) approach, consisting of three modules:

(a) Indicators, both global and national/local;

(b) A conceptual framework that allows the integration of indicators;

(c) Indicator sourcing and management mechanisms at the national/local level.

11. The M&E approach should be designed such that these modules interact so as to improve the information and knowledge base for addressing DLDD processes across scales, and the reporting on progress made in this. An agreed operational delineation of affected areas is a prerequisite for focusing the action and reporting on progress made in addressing DLDD processes.

12. Ideally, “storylines” developed at local scale, that is, the documented history of successes and failures experienced at a particular site threatened by desertification and related processes, should provide the information and knowledge required to understand the dynamics of DLDD processes. The production of storylines should be supported by a coordination system across spatial and governance levels, backed up by sufficient resources to deliver the quality that is required to feed the local understanding of the land degradation and desertification systems, to plan local mitigation and adaptation policies, and inject fresh ideas and concepts to enable the adaptive evolution of the M&E approach, including the necessity of new indicators.

13. Building and continuously updating storylines at representative hot and cold spots (see section II.A below) in each country emerges as the main source of local information

(documentation and ground survey), which can be shared between Parties and framed in global assessments.

II. Recommendations and implementation guidelines

14. The AGTE invites the CST to bring to COP 11 the recommendations 1 to 14 included in sections A to F below. The recommendations of the AGTE are accompanied by: (a) rationale statements that explain how the AGTE reached its conclusions; and (b) implementation guidelines which provide further advice on how the recommendations, if approved by the COP, can be put into practice by affected country Parties.

A. Operational delineation of affected areas

15. Within and between countries, variability of conditions, capacities and local data availability risks hampering the participation of all affected countries in the delineation of affected areas. The experience from the pilot tracking exercise (Schulte-Herbrüggen et al., 2012) and from the 2012–2013 reporting and review cycle (documents ICCD/CRIC(11)/8-ICCD/CST(S-3)/6 and ICCD/CRIC(11)/15) show that lack of data that are spatially explicit to affected areas is the main constraint. The participation of every affected country Party in this process is a requisite for a successful preliminary step to formulate strategies and policies for desertification control, and the above-mentioned reasons warn against too ambitious approaches in terms of data requirements and sophistication. Methodologies for identifying and delineating affected areas should be as simple and requiring as little data as possible. Nevertheless, the delineation procedure should provide a frame so that applications within and between countries can be linked, and reporting on global DLDD is enabled.

Recommendation 1

It is recommended that the delineation process be carried out in two steps:

(a) The first step should be mandatory. Affected country Parties would delineate affected areas by using the UNCCD definition of drylands as the default definition. Additionally, affected country Parties may also delineate areas affected by land degradation beyond drylands;

(b) The second step intends to further divide the affected area into the following types, reflecting distinct stages of desertification, which should be optional and up to Parties' discretion to characterize:

(i) Potentially affected but without evidence of risk;

(ii) At risk of being affected;

(iii) Actually affected;

(iv) Affected in the past but lacking current desertification drivers (inherited desertification).

(a) Rationale

16. The possibility of expanding the delineation of affected areas beyond the domain of desertification is reflected in the discussions of the UNCCD 1st Scientific Conference (in particular Working Group 1, "Integrated Methods for Monitoring and Assessment of

Desertification/Land Degradation Processes and Drivers").[2] The issue has reached political momentum through the call at the 2012 United Nations Conference on Sustainable Development (Rio+20) to achieve a land degradation neutral world in the context of sustainable development, and to monitor land degradation globally (Rio+20 outcome document "The future we want", paragraphs 206 and 207, respectively).[3] However, the main controls of land degradation change from water scarcity and radiation excess in drylands (to which the delineation is currently limited), to water excess and radiation deficit in humid climates. This means that ecosystem functional patterns and SLM concepts and methods are likely to be different.

(b) Implementation guideline

(i) Delineating dryland boundaries

17. To delineate dryland boundaries it is proposed that an integrative, simple and widely accepted index, such as the aridity index (AI) (i.e. annual rainfall over potential evapotranspiration (PET)), be used (UNEP, 1992). Its values should be within the UNCCD accepted limits ($0.05 < AI < 0.65$), which include arid, semi-arid and dry sub-humid classes.

18. Methodological options for plotting digital layers of AI include using a standard length (i.e. 30 years) for the climatic series. Spatial and temporal resolution options go from (a) using already computed digital layers of AI annual averages or normal values without control of the PET algorithm to (b) using raw climatic data series from weather stations and interpolating spatial layers for each component of AI, each month of the 30 years, with control of the PET algorithm. There is a range of intermediate options, all of them using country or global databases. The default option does not require any specific capacity but it is not possible for the user to control anything. Resolution is often around 0.5º (around 50 km), which is certainly low but nevertheless acceptable taking into consideration the spatial gradients of climate variation. The most advanced option requires geographical information systems management capacity and allows resolution (often around 8 km) and errors to be controlled through spatial interpolation.

19. It is proposed that option (a) be considered as the minimum default while advising Parties to invest in building their own climatic databases using option (b), which allows the mapping of annual AI variability. Having one climatic layer per year implies the possibility of including a temporal variability component to the delineation, adding an important stress source to static assessments. Using option (b), non-binding consensus among Parties on a PET algorithm that optimizes cost and accuracy should be sought.

20. Metadata links and methodological guidance for different options with regard to PET estimates and AI plotting will be available at the AGTE-rec portal (see Recommendation 8).

(ii) Distinguishing types of affected areas

21. Distinguishing types of affected areas serves the Parties in deciding on mitigation and adaptation actions. To distinguish between the four types referred to in Recommendation 1, (b) (i–iv) (see box above), it is proposed that a combination of rates of change of socioeconomic pressures and records of their impacts on the territory be used; a reference experience may be found in SURMODES (2000). Mapping rates of change of

[2] <http://dsd-consortium.jrc.ec.europa.eu/php/index.php?action=view&id=150>.

[3] United Nations General Assembly resolution A/Res/66/288.

socioeconomic pressure (over a decade) allows the dryland area to be divided into three sectors: areas with significantly increased pressure (areas at risk or hot spots), areas where drivers have disappeared (inherited desertification or cold spots) and areas where pressure has not changed significantly, thus remaining in their original status of potentially affected area. Documenting hot/cold spots offers an opportunity to initiate storylines, which would improve scaling and country comparability. In that sense, an early interaction with the DPSheIR (Driving Force – Pressure – State – human and environmental Impact –Response) framework is advisable (see section C below).

22. Current impacts on the land, ascertained according to whether hot spots are actually affected areas and cold spots are recovering areas, are recorded by: (i) published surveys; (ii) corroborating campaigns in the field concerning soil functions and water vulnerability; in the latter case global information and developments may frame the catchments and aquifers where hot spots are located (IWRM, 2000; WHYMAP, 2000); (iii) evidence of fast land use/stock breeding changes and extraction activities; and (iv) (where capacity is available) using remote sensing facilities to assess trends of vegetation density once rainfall variability effects have been removed. Field survey is an essential step and requires a small team of thematic experts led by a generalist able to extract diagnoses and syndromes using descriptions and narrative indicators, which are intended to be included in Parties' reports. WOCAT-LADA-DESIRE (2008) approaches could be consulted as methodological sources for assessing current DLDD impacts.

23. Activity (iii) strongly relies on land use system (LUS) changes, which means that LUS classifications used by Parties should be harmonized.

24. Activity (iv) proposes the only unambiguous procedure so far for assessing vegetation density trends after removing the effect of rainfall inter-annual variability. Recent developments (Bai et al., 2010; Brabant, 2008; CSFD, 2010; del Barrio et al., 2010; State Forestry Administration P.R. China, 2008; Ajai et al., 2009; Cherlet et al., 2012), allow appropriate earth observation methodologies to be chosen.

25. The outcome of this two-step country-level delineation and characterization of affected areas will be a strong and well-documented assessment of the situation and trends of desertification in the countries. If successful, it is suggested that a set from the used variables be selected to design a global monitoring activity to provide information about the global trajectories at the country level, which in turn could be the start of a truly global monitoring system in line with the concept of a Global Drylands Observation System (GDOS) (Verstraete et al., 2011). This process should foresee interaction with the indicator integration framework to streamline information and knowledge for decision makers at various levels (see section C below).

(iii) Combining delineation variables

26. In order to combine variables displayed at different spatial resolutions when delineating affected areas, as when combining biophysical and socioeconomic drivers and indicators, it is suggested that they be linked through LUSs, since LUSs are often displayed at the same spatial resolution as biophysical variables.

27. In the case of small non-affected areas (e.g. mountains) close to or inside affected areas, it is suggested that the same delineation criteria be adopted for both, since non-affected areas often act as sources for a variety of resources (water, labour force, etc.) used in affected areas.

(iv) Drought monitoring

28. Drought (probability) is too complex a phenomenon to be part of the focus in the delineation of affected areas. Rather, it is proposed that climatic variability (see paragraph

19 above) be considered as surrogate/proxy for the climatic component of drought. In fact, drought is triggered by rainfall variability and is modified by user demand and the availability of natural or artificial regulation facilities, as well as by soil hydraulic properties. Chronic drought fluctuations often trigger desertification.

B. Global and national/local indicators

1. Recommendation 2

It is recommended that the term "progress indicator" be used, rather than "impact indicator", when referring to the indicators used to track progress in the implementation of the Convention against the strategic objectives of the Strategy.

Rationale

29. The term "impact (indicator)" in relation to tracking progress in the implementation of the Convention against the strategic objectives of the Strategy is different from its use in the context of the DPSIR (Driving Force-Pressure-State-Impact-Response) indicator framework, a core component of the provisionally accepted indicator framework. In the former case, it refers to measuring the impact of the implementation of the Convention against the strategic objectives of The Strategy; in the latter case, "impact" is part of the DPSIR causal chain. In order to avoid confusion, a new terminology is proposed.

2. Recommendation 3

It is recommended that the set of impact indicators provisionally adopted by decision 17/COP.9, refined through a scientific peer-review process,[4] be further refined to the minimum set of global indicators listed in the table below. National estimates of each respective metric(s)/prox(y)(ies) based on global products could be provided to affected country Parties through the performance review and assessment of implementation system (PRAIS) portal, and should subsequently be verified and enhanced, or replaced using data sourced/computed nationally/locally (aggregated where needed) following the methodology available through the AGTE-rec portal.

[4] See document ICCD/COP(10)/CST/2 (pp. 13–14).

Proposed refinements to the provisionally adopted set of impact indicators

Indicator	*Metrics/Proxies*	*Description*	*Potential data source/Reference methodology*
Strategic objective 1: To improve the living conditions of affected populations			
Trends in population living below the relative poverty line and/or income inequality in affected areas	**Poverty severity (or squared poverty gap)** *or*	Takes account of both the distance separating the poor from the poverty line and the inequality among the poor	World Bank methodology[a, b]
	Income inequality	Alternative to the poverty severity metric for those countries where poverty is no longer an issue; strategic objective 1 has in this sense already been reached	OECD* methodology[c]
Trends in access to safe drinking water in affected areas	**Proportion of population using an improved drinking water source**	An improved drinking water source is defined as one that is protected from outside contamination through household connection, public standpipe, borehole, protected dug well, protected spring, rainwater, etc.	WHO/UNICEF* Joint Monitoring Programme for Water Supply and Sanitation methodology[d]
Strategic objective 2: To improve the condition of ecosystems			
Trends in land cover structure	**Vegetative land cover structure**	Intended as the distribution of land cover types of greatest concern for land degradation (excluding artificial surfaces) by characterizing the spatial structure of vegetative land cover; it should include and specify natural habitat classes	Sourced from products like GlobCover[e, f] or finer-resolution products under development (Gong et al., 2013); and following established land cover classifications (e.g. FAO/ UNEP LCCS* [g])
Trends in land productivity or functioning of the land	**Land productivity dynamics**	Based on long-term fluctuations and current efficiency levels of phenology and productivity factors affecting standing biomass conditions	New World Atlas of Desertification methodology;[h] update foreseen every five years
Strategic objective 3: To generate global benefits through effective implementation of the UNCCD			
Trends in carbon stocks above and below ground	**Soil organic carbon stock** *to be replaced by*	Intended as the status of topsoil and subsoil organic carbon	Sourced from e.g. the GTOS* portal[i]
	Total terrestrial system carbon stock *once operational*	Including above- and below-ground carbon	To be streamlined with the GEF*-financed UNEP* Carbon Benefits Project[j,k]

Indicator	*Metrics/Proxies*	*Description*	*Potential data source/Reference methodology*
Trends in abundance and distribution of selected species *(potentially to be replaced by an indicator measuring trends in ecosystem functional diversity once system understanding and data production allows)*	**Global Wild Bird Index**	Measures average population trends of a suite of representative wild birds, as an indicator of the general health of the wider environment	Following the indicator guidance provided for and to be streamlined with the CBD* process[l, m]

*Abbreviations:
CBD - Convention on Biological Diversity
FAO - Food and Agriculture Organization of the United Nations
GEF - Global Environment Facility
GTOS - Global Terrestrial Observing System
LCCS - Land Cover Classification System
OECD - Organisation for Economic Co-operation and Development
UNEP - United Nations Environment Programme
UNICEF - United Nations Children's Fund
WHO - World Health Organization

[a] <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20242881~isCURL:Y~menuPK:492130~pagePK:148956~piPK:216618~theSitePK:430367,00.html>.

[b] <http://siteresources.worldbank.org/INTPA/Resources/tn_measuring_poverty_over_time.pdf>.

[c] <http://www.oecd.org/els/soc/43540354.pdf>.

[d] <http://www.wssinfo.org/>.

[e] <http://due.esrin.esa.int/globcover/>.

[f] <http://www.gofcgold.wur.nl/sites/gofcgold_refdataportal.php>.

[g] <http://www.fao.org/docrep/003/X0596E/X0596e00.htm>.

[h] <http://wad.jrc.ec.europa.eu/>.

[i] <http://www.fao.org/gtos/tcoDAT.html>.

[j] <http://carbonbenefitsproject-compa.colostate.edu/>.

[k] <http://www.unep.org/climatechange/carbon-benefits/Home/tabid/3502/Default.aspx>.

[l] <http://www.unep-wcmc.org/wild-bird-index_568.html>.

[m] <http://www.bipindicators.net/WBI>.

Rationale

30. The recommended common global indicators should enable change to be tracked over time, in particular to show trends in degradation/restoration. This refinement is based on a thorough revision of prior work done on the identification and selection of progress indicators, culminating in the outcomes of the scientific peer review and pilot tracking exercise considered in detail by the CST at COP 10. It is an effort to address scientific concerns and pragmatic realities in a concerted way. In line with and/or in addition to the

evaluation criteria used in that process (based on the Millennium Ecosystem Assessment (MA) criteria), the AGTE considered the following criteria:

(a) There should be only a few common, global indicators;

(b) There should be at least one indicator for each of the three strategic objectives;

(c) They should have the potential to report specifically on progress made with respect to the Convention (the "specific" criterion in the economic – Specific – Measurable – Achievable – Relevant –Time-bound (e-SMART) criteria);

(d) They should be sensitive, yet robust enough to track change over time (the "time-bound" criterion in the e-SMART criteria);

(e) Overlap among the indicators comprising this minimum set should be avoided;

(f) It should be possible to classify the indicators according to the indicator classes provided in the DPSheIR indicator framework;

(g) Selected indicators should allow reporting on the impact of addressing DLDD, rather than documenting drivers of DLDD processes;

(h) They should be measurable, that is, preferentially quantifiable and scalable (the "measurable" criterion in the e-SMART criteria);

(i) They should be practical, that is, corresponding to existing data collection capacities (the "achievable" criterion in the e-SMART criteria);

(j) They should be essential, that is, useful to the process and its stakeholders and allowing for indicators that are currently not operational but nevertheless deemed essential (the '"relevant" criterion in the e-SMART criteria);

(k) Their scientific consistency should be demonstrated by publication in a high-standard peer-reviewed journal;

(l) Their technical capacity should be demonstrated by application to an area and objective of similar extension, spatial resolution and complexity as envisaged in DLDD M&E;

(m) They should be scalable to potential values at climatic-specific conditions;

(n) Validation of their underlying algorithm should be feasible;

(o) Overlaps between the minimum set of progress indicators and the variables used to delineate affected areas should be avoided to the extent possible; land cover provides an obvious link between both.

31. Even though global products could be used to generate national estimates for most of the progress indicators, verification and enhancement at the national/local level is required to justify their use at that level.

3. Recommendation 4

It is recommended that the set of common, global progress indicators be complemented with formal and narrative indicators at national/local scale that could be sourced from (predominantly) local storylines and could provide more detailed information on the level and characterization of land degradation that is specific to each context.

(a) Rationale

32. A minimum set of progress indicators is essential for consistent global M&E; however, this will not capture the full complexity of progress, making local/national indicators and associated storylines essential. Thus, efforts to monitor the impacts of the Convention across the Parties in a unified way must include both a minimum set of indicators with corresponding metrics/proxies, and the means to account for national, subnational and local realities. In addition, progress indicators (which are typically state indicators or indicators on impacts on ecosystem services or human well-being within the DPSIR-MA framework (annex II, figure)) measure only progress in implementing the Convention, but not the driving forces that led to the progress or the policy responses implemented. As such, additional narrative indicators would allow the causes of DLDD processes to be investigated and are needed to establish a coherent understanding that provides context.

33. Thus, a deeper understanding of the local DLDD processes and the nature of the linkages in the coupled human–environmental system can contribute to improved global information and knowledge on DLDD.

(b) Implementation guideline

(i) Monitoring and evaluation of sustainable land management

34. M&E of SLM is suggested as an essential, parallel activity to UNCCD progress assessment, as this is the primary tool being employed towards obtaining global environmental benefits. SLM is a practice that may lead to impacts rather than being an indicator of progress. The effectiveness of SLM can be measured through a variety of progress indicators. It can be measured by investment and value obtained, as well as by land managed sustainably. The extent of SLM (area and expenses) could be reported under strategic objective 4 (mobilization of resources), and/or possibly as a supplement to the operational delineation of affected areas. The World Overview of Conservation Approaches and Technologies (WOCAT) has developed a number of methodologies for monitoring and reporting on SLM at plot/local scale. However, transfer to the global level and trade-off between local and global scales is not yet settled, since this depends on decisions to be made regarding how to upscale local sustainability (World Bank, 2008) and how to account for trade effects (ICTSD, 2007). Given the actively developing concept of SLM first at local scale, and more recently at global scale under World Bank sponsorship, it is suggested that its synergies be explored with the DPSheIR integration framework (see section C below).

(ii) Criteria for the selection of national/local indicators

35. The combined and integrated use of global progress indicators and local/national, context-specific indicators, whereby the storylines generated at the local to the national level feed into the information and knowledge base at the global level, implies that the quality of the indicators used across scales should be comparable. Commonly accepted quality criteria for indicator selection, such as the e-SMART criteria, should therefore also be observed when selecting indicators at higher spatial resolution (regional, subregional, national and subnational local levels).

C. Conceptual indicator integration framework

Recommendation 5

It is recommended that a new indicator integration framework be implemented as part of the M&E approach to track progress and report at multiple scales on meeting policy objectives addressing DLDD. The new integration framework, DPSheIR, allows impacts on human well-being to be recorded along with impacts on ecosystem services.

(a) Rationale

36. The proposed DPSheIR draws on the DPSIR-MA conceptual framework (annex II, figure). As DPSIR-MA, it combines the exploratory and diagnostic capacity of MA to deal with complex multi-driven systems, with the sharp orientation of DPSIR to deal with policy evaluation. At the same time, it also implies a simplification of the DPSIR-MA framework, being easier to use in routine M&E implementation. This option would be a major improvement to the DPSIR-MA for M&E, since it explicitly includes human–environment interactions.

(b) Implementation guideline

(i) Building and using the DPSheIR framework

37. The DPSheIR should be built on the DPSIR framework, specifying human and environmental impacts, resulting in a six-box structure. Thus impacts on human well-being can be recorded along with impacts on ecosystem services.

38. DPSheIR can be used for reporting at multiple scales, while its actual population of indicators should be scale-, location- and purpose-specific. The ultimate goal of M&E is supporting decision makers at various levels. Developing an integration framework such as DPSheIR and populating it with indicators must keep this final use clearly in mind, and must be appropriate to the level of decision making at which it is aimed (Schwilch et al., 2011). At the project level it should lead to improvements in project implementation. At the national and global levels it should lead to improved policy, policy instruments, procedures, and communication.

39. DPSheIR also allows explicit links to be made to each of the three strategic objectives. Thus the DPSheIR framework can be used to evaluate the degree of implementation of the strategic objectives and best policies to cope with DLDD in affected countries.

(ii) Developing a system dynamics-based understanding of desertification/land degradation and drought processes

40. Desertification as a process is already reasonably understood based on 30 years of research and experience (Puigdefabregas, 1995; Reynolds et al., 2007; Hellden, 2008; Ibañez et al., 2008; Cornet, 2012). It has evolved from a simple list of catastrophes to a more functional concept where driving forces, state variables and system controls explain the observed symptoms. It is therefore possible and desirable to use this systemic approach to progressively structure the integration framework with increased detail.

41. It is proposed that the new integration framework be supported by a system dynamics-based understanding of DLDD processes (SDUDP), which would facilitate the required system understanding.

42. SDUDP development will rely on two pillars: the available systemic knowledge about the dynamics of desertification, and the fresh findings from local cases. Its starting structure includes three groups of processes: (i) management of trade-offs between the different strategic objectives through controlling the space shared among LUSs (e.g. via SLM); (ii) evaluation of the impact of climatic and socioeconomic drivers; and (iii) evaluation of the internal positive or negative impacts of internal and external (to the system) reactions both on LUSs and on achieving the strategic objectives. Thus SDUDP provides DPSheIR with functional information to support the interpretation of the interactions among indicators and hence the integrative capacity of the framework.

(iii) Implementation of DPSheIR

43. Implementing DPSheIR should be an evolving adaptive process with the interaction of actors at all levels of coordination bodies: subnational, national, Regional Annexes coordination bodies and global UNCCD coordination.

44. Unless previous knowledge about the dynamics of the system is available, populating DPSheIR with indicators should be a gradual process and should always be coupled with research progress. Research would enable a continuous updating of the framework and explanation of M&E results; otherwise, the M&E process will have limited value. DPSheIR development should not include a commitment to carry out research, but links with advances in research that allow upgrading have to be kept. Parties should be encouraged to carry out research to better understand their local DLDD problems and be advised to implement national DPSheIR units to develop locally applicable sets of indicators that can track key processes and variables of local importance. Collecting appropriate baseline data should be a task within this research process. Although some of these data may be reassessed during routine monitoring, much of this information will not require regular monitoring or reassessment.

(iv) Combined use of the DPSheIR and SDUDP frameworks

45. One of the greatest strengths of using a framework such as DPSheIR is probably that it is a rigorous way to explain what is happening and why. However, explaining the “why” is progressive, since it may require additional data that go beyond a starting, limited set of indicators, and rely on SDUDP development.

46. A major outcome of the combined use of the DPSheIR and SDUDP frameworks is the provision of a robust understanding of the DLDD systems concerned. This knowledge fortifies its integration capacity to support the following key interactions that are described in other sections:

(a) Enabling the upscaling/downscaling feedback loop that allows synergy between the local and global levels (see section E below);

(b) Drawing storylines able to integrate the work of national action programmes (NAPs) and to help Parties to solve their own problems and, in particular, characterize the hot/cold spots identified in the advanced delineation of affected areas (see paragraph 12 above);

(c) Providing Parties with conceptual and functional support to their chosen indicators sets, which improves their capacity to interpret them (see Recommendation 8);

(d) Ensuring comparability between countries through the syndrome approach (see paragraph 22 above);

(e) Helping the formulation of research and action projects (see paragraph 50 below);

(f) Delivering DLDD information at global scale in line with a GDOS (see paragraph 25 above) and framing synergies with global initiatives (SLM) (see paragraph 34above).

D. Monitoring and evaluation mechanism of national/local relevance

Recommendation 6

It is recommended that national/local indicator selection and reporting be fully and formally linked to national/local DLDD and SLM M&E efforts and be tied to NAP alignment efforts. In this sense, outcome 2.2 of The Strategy (decision 3/COP.8) by which affected Parties were requested to revise their NAPs into strategic documents supported by biophysical and socioeconomic baseline information (as reference for monitoring), and to include them in integrated investment frameworks, should be reiterated. In the same vein, Parties are also encouraged to establish targets in relation to the progress indicators proposed in the table above.

(a) Rationale

47. A small set of common, global indicators focused on policy analysis will not capture the full complexity of progress, making a mechanism for local/national indicators and associated understanding essential to global M&E. A mechanism for local/national relevance must be integrated not only into UNCCD progress assessment, but also into M&E at all scales. Thus the proposal is not for a new system, but for promoting the use and integration of existing and future efforts to monitor and evaluate DLDD and SLM at all scales. This approach recognizes and capitalizes on the reality that the incentive for reporting is not land degradation per se, but rather the benefits that come from addressing it (e.g. through SLM). Furthermore, national-level M&E processes should be in place to ensure sound national policy development aimed at enhancing both SLM and local livelihoods. This clearly should underpin processes of alignment of NAPs. NAP alignment was made part of The Strategy (outcome 2.2), as referred to in Recommendation 6 (see box above). This guidance and harmonization through the NAP alignment can further reinforce the integrated and combined use of global and local, both formal and narrative, indicators to generate knowledge of DLDD. Furthermore, having a formally agreed and harmonized mechanism across spatial scales will facilitate addressing the cross-border nature of DLDD processes.

(b) Implementation guideline

(i) Engaging local stakeholders

48. NAPs comprise local activities on the one hand, and contribute to global M&E needs on the other. In aligned NAPs, objectives, targets and benchmarks should be set based on socioeconomic and biophysical baseline information and in harmony with the required reporting process. This is possible through engagement with a wide range of relevant local stakeholders from the start of the NAP alignment process when developing appropriate M&E procedures.

49. It is therefore essential that the NAP alignment process include a harmonized approach for soliciting local input from local stakeholders, so that this can inform national

to global reporting. Furthermore, the importance of area-based or territorial development approaches is increasingly recognized in addressing complex development problems in specific geographical areas. Key characteristics of such approaches are: bottom-up and participatory (highlighting the involvement of stakeholders), inclusive (across different societal groups), integrative (across economic sectors) and flexible (i.e. responsive to changes) (Harfst, 2006; Vrbensky, 2008).

(ii) Integrating monitoring and evaluation efforts in community development activities

50. M&E of DLDD should not be done simply as a mandatory reporting exercise to the COP, but rather should be incentivized through the benefits that it can bring to local/national development. Reporting on indicators should therefore involve the local assessment of the outcome of the M&E process, and should be driven by the local/national need for the data, rather than the global reporting obligation. Land degradation and human well-being are intrinsically linked; however, environmental interventions and development efforts are not always carried out synergistically.

51. Integration of DLDD and SLM M&E into community development plans (CDPs) is required to highlight the benefits of M&E and reporting to broader development efforts at the local level. From a policy perspective, this link can be promoted through a more formal tie between NAPs and CDPs.

52. The value of participation in progress indicator selection and reporting at the local level is the capacity for resultant M&E data to inform decision-making intended to improve livelihoods and overall well-being. It is therefore essential that efforts to combat desertification include an M&E component that is tied to (and can strengthen) community development activities.

(iii) Integrating monitoring and evaluation efforts into project financing guidelines

53. Implementation of DLDD M&E guidelines can be expected only when the conditions for learning and capacity-building are created and appropriate resources, in particular financial resources, are allocated. In order to ensure consistency and to further promote the integrated approach between global UNCCD progress assessment and local to national M&E efforts, indicator selection and associated reporting requirements should be integrated into project financing guidelines. In this sense, it is important that scale-appropriate M&E guidelines be provided with the financing of any "development intervention". This would include an associated requirement that projects undertake local M&E with outputs that are useful to local CDP efforts and which can also be reported to the national level.

54. However, concerted financing efforts are required in order to optimize the use of limited resources. In this sense, embedding projects in longer-term strategies and programmes (such as the UNCCD Scientific Knowledge Brokering System (SKBP) (see document ICCD/COP(11)/CST/6), or the Global Mechanism integrated financing strategy) is of the essence. This is also in line with outcome 2.2 of The Strategy, as referred to in Recommendation 6 (see box above).

(iv) Trade-offs in addressing local versus global concerns

55. Within the mechanism referred to in paragraph 47 above, some resources should be earmarked for financing the prioritization of global over local benefits, which may happen in the context of trade-offs between strategic objectives, and in particular when applying the concept of SLM. In fact, it is not possible to fully meet the three strategic objectives at the same time, since they conflict with each other. Strategic objective 3 on global benefits assumes the role for this trade-off in referring to SLM; sustainable by definition recognizes

trade-offs between economic, social and environmental components. However, SLM also requires striking a balance between local and global concerns in SLM. This trade-off implies that Parties should be compensated for the potential loss of local benefits at the expense of global benefits, in line with the concept of a land degradation neutral world.

E. Linking across scales

Recommendation 7

It is recommended that a positive feedback loop (both ways) be built between local and global scales supported by a coordination system across spatial and governance levels. The national level should be responsible for identifying sites and systematically gathering the storylines coming from local M&E that are required to understand the dynamics of DLDD. The global level should be responsible for generalizing this information over the national, subregional, regional and global levels.

(a) Rationale

56. In the present situation there is a lack of information flow. Parties deliver their evaluations of strategic objectives through global indicators in their territories without any feedback, while their local indicators are developed and applied locally. The whole system is therefore unable to react in an integrated way and deal appropriately with DLDD. The creation of a coordination system across spatial and governance levels would enable an information flow across UNCCD institutions so as to provide support to policies and specific actions in the field of desertification and land degradation.

(b) Implementing guideline

Scale dependency of indicators

57. Indicators of land degradation and desertification are scale-dependent; that is, the resulting measurement depends on the area being considered and the process of land degradation being assessed. Thus, technical, logistical and scientific issues make the aggregation of indicator data from local to global scale challenging. At the same time, for some indicators it is easier and more accurate to recapture the data at different scales, rather than attempting to consolidate and aggregate data. Nevertheless, the storylines coming from local M&E can be upscaled for global reporting, enhancing the potential to generate information and knowledge from the minimum set of global progress indicators used by all Parties. In this sense, using the correct indicator for a situation-specific purpose may be more important than the need to upscale/downscale these specific data. The combined and parallel use of global progress and national/local formal and narrative indicators can thus strengthen the reporting on combating DLDD. In addition, facilitating the upscaling of local to national storylines into global reporting allows the number of common progress indicators to be limited, focusing on the strategic objectives only.

58. In the case of intrinsic scale dependency of indicators/variables (i.e. if their values change with their resolution), special care should be taken when considering the integration, and in particular the aggregation, of such data. Note that integrating (upscaling or downscaling) indicators is distinct from aggregating indicators (e.g. by calculating a weighted index) across scales. Indicator metrics/proxies (including their units) need to be carefully specified in the UNCCD reporting manual for strategic indicators and

performance indicators,[5] and precautions need to be taken if metrics/proxies are integrated or aggregated to document DLDD at a lower spatial resolution/less-detailed spatial scale.

59. In the case of contextual scale dependency of indicators/variables (i.e. they change across scales embedded in more generic variables), upscaling and downscaling will be possible only if they are supported by the same function across scales. This suggests the need for a common integration protocol, with the national level responsible for identifying sites, systematically gathering the storylines coming from local M&E that are required to understand the dynamics of DLDD, and generalizing this information over the national, sub-regional, regional and global levels.

60. Integration of formal and narrative indicators (potentially at all scales) could be harmonized and normalized through the use of easy-to-understand ordinal scales tailored to each indicator, such as the scorecard approach that the United Nations Development Programme, the United Nations Environment Programme and the Global Environment Facility (GEF) have implemented on capacity development in GEF projects.

61. Thus, the combined use of global progress and national/local formal and narrative indicators allows both reporting globally, while maintaining relevant and context-specific local/national information (Abraham et al., 2006; Abraham, 2009), and dealing locally with global constraints (Kiparsky et al., 2012).

(c) Implementation guideline

Progress in DPSheIR implementation

62. DPSheIR progress is tied to receiving fresh local information from Parties through SDUDP. Parties are expected to deliver formal and narrative information in terms of local/national indicators and function variables to the DPSheIR framework for global reporting. DPSheIR uses them to upgrade its own integration and sends back support and refined tools to help Parties' understanding of their problems and guide their responses. Therefore, its role is to provide dynamic input to feed the whole information flow. Owing to the different indicator classes/functional structures identified in DPSheIR and its scaling capacity, DPSheIR should provide the structure to elicit and channel back information from and to countries. Using the DPSheIR indicator classes/functional structures allows countries to make progress on interpreting their local/national indicator sets in terms of their interactions and causal chains. This will subsequently help Parties in identifying policies to modify their progress rate. Feeding the feedback loop in this way provides an additional foundation for harmonizing variables. The fact that variables at different scales can be harmonized if they are part of the same function increases the overall M&E harmonization capacity.

[5] Available at: < http://www.unccd.int/en/programmes/Reporting-review-and-assessment/Documents/Reporting%20manual_version%201_ENGLISH.pdf>.

F. Technical and resource requirements for current and ongoing development

1. Recommendation 8

It is recommended that a portal (named AGTE-rec) be created that works as a goal-oriented knowledge brokering system aimed at improving access to and the consumption of tools/methods and data needed by Parties to implement the AGTE recommendations. It is also recommended that the possibility of including AGTE-rec in the SKBP frame be explored for mutual benefit and avoiding duplication. Sharing of best methodologies for monitoring and evaluation across scales of SLM practices could be embedded in this context.

(a) Rationale

63. Accessibility to public data and methods is one of the big challenges in enabling Parties to implement the AGTE recommendations. AGTE-rec aims at improving access to and the consumption of scientific and technical information to all actors involved in the UNCCD processes. AGTE-rec is not a library of resources but a set of links to relevant sources, databases and solutions created to solve specific problems.

(b) Implementation guideline

Developing the AGTE-rec portal

64. Decision trees will guide users to the most suitable options for their specifications. Agreements should be achieved with database keepers and solution developers to solve minor problems of accessibility and interpretation from the users' side.

65. AGTE-rec should be owned by UNCCD, and coordinated through the CST. In turn, NFPs and STCs could facilitate and promote access to the portal, for both input and output, in their respective countries. The year-to-year, technical maintenance of the repository could be outsourced. However, the design and prototype of such a repository should involve the concerted effort of scientific teams with experience of DLDD processes, and follow the AGTE recommendations.

2. Recommendation 9

It is recommended that a broader down-to-earth capacity-building programme be established that touches on the capacity issues related to the implementation of the M&E approach suggested by the AGTE. Capacity-building should be envisaged as a medium-term participatory process shared by all actors.

(a) Rationale

66. Implementing the M&E approach as outlined in the AGTE recommendations will require capacity-building.

(b) Implementation guideline

Capacity-building

67. It is proposed that the capacity-building programme be developed around specific cases supporting storylines, with the active participation of:

(a) Policy decision makers and users at the local, national, regional and global levels, all of whom should express their requirements, with technical staff who should help to run and interpret the applications. Technical staff thus need to be familiar with the procedures (training activities);

(b) Developers responsible for the selected procedures and their application;

(c) Mediation bodies (such as small and medium-sized enterprises or non-governmental organizations) between developers and users;

(d) Coordination provided by the national and regional UNCCD structures, as well as the CST.

68. The capacity-building programme should be anchored in the implementation of other activities (e.g. delineation of affected areas, implementation of the DPSheIR integration framework), where training and coordination support evolve organically as needed.

69. Guidance on capacity-building design should be provided; in particular, Parties should be advised to organize programmes in line with CDPs. Precise curricula and budgets should be prepared to explore funding options, taking into account that applications could involve several countries of a region of the respective UNCCD Regional Annexes.

3. Recommendation 10

It is recommended that the current reporting protocol of PRAIS be adapted in line with the implementation of the suggested M&E approach.

Rationale

70. For the proposed M&E approach to contribute to an improved global understanding of DLDD processes and the reporting thereof, streamlining of the current reporting system with the proposed approach is required.

4. Recommendation 11

It is recommended that the feasibility of the suggested M&E approach be assessed through testing the following: methods for operationally delineating affected areas; the indicator integration framework; the use of local to national storylines to generate global information and knowledge; and the minimum set of common indicators and analysis methods.

(a) Rationale

71. Testing and, when required, revision are essential for successful implementation of ideas and concepts, however sound they may be from a theoretical and scientific point of view.

(b) Implementation guideline

Testing

72. The tests should include the review of available data, baselines and monitoring systems existing at the national and local levels to populate the UNCCD set of common indicators, analysis of the gaps and review of capacities.

73. Testing should be part of both local engagement in the indicator development process and capacity-building. Testing should also evaluate whether the set of indicators, when taken together, are covering all requirements for the information necessary to assess progress.

5. Recommendation 12

It is recommended that both the DPSheIR and the global indicator set adopted by the country Parties be regularly re-evaluated for appropriateness as monitoring and evaluation efforts mature, for their usefulness in decision-making, and because needs may change and scientific tools and technologies may improve.

Rationale

74. This core principle, documented in document ICCD/COP(10)/CST/2, is fundamental to the long-term effectiveness of the global M&E.

6. Recommendation 13

Building up an information and knowledge base by implementing and maintaining DPSheIR is a slow and coordination-demanding process. This process needs to be embedded in existing reporting procedures and requires connection to PRAIS, under the supervision of an ad hoc panel from the CST or other mechanism, as decided by the COP based on the results of the work carried out by the Ad Hoc Working Group to Further Discuss the Options for the Provision of Scientific Advice, Focusing on DLDD Issues (AGSA) (see ICCD/COP(11)/CST/3). These coordinating procedures would enable the feedback loop between local and global scales (see recommendation 7) and should be connected to Parties' technical teams that manage local databases and the continually updated versions (by local input) of DPSheIR, as long as Parties have this technical capacity.

Rationale

75. Even if DPSheIR does not foresee research, it has to be associated with research that enables a continual updating of the framework and explanation of M&E results; otherwise, the M&E process will have only limited value.

7. Recommendation 14

It is recommended that synergies with M&E processes under other Conventions (e.g. the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change) be established and/or maintained when implementing an M&E approach for addressing DLDD processes and reporting under the UNCCD, at both the global and the national level.

(a) Rationale

76. In the frame of M&E, the e-SMART criteria are commonly considered good practice in selecting indicators. The economic criterion refers among others to the fact that data should be affordable, that is, available at a reasonable cost, and that no inefficient and expensive means of verification are required. In order to optimize the use of the resources available, it makes sense to rely on data already collected and validated through existing monitoring programmes. In addition, making use of readily available data, provided that these are relevant within the UNCCD reporting context, allows the information base and knowledge already generated through such parallel initiatives to be capitalized on, which has a bearing on the formulation of management options. Nevertheless, institutionalization is needed to guarantee the realization of such synergies.

(b) Implementing guideline

Synergies

77. At the national level, attention should in particular be paid to alignment with NAPs and data collection at the institutional and the technical level, respectively. Thematically, most benefits could be gained from synergies in the areas of biodiversity conservation, restoration of degraded ecosystems and SLM, with a view to the holistic management of natural resources.

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Annex I

[English only]

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Annex II

[English only]

Background material derived from previous phases of the iterative process for impact indicator refinement

1. These recommendations and the underpinning peer-reviewed working paper (in progress) build on a set of impact indicators provisionally accepted by the Conference of the Parties (COP) and an accompanying indicator framework. Details of the various steps undertaken so far in this iterative, participatory indicator refinement process are extensively documented in the White Paper, "Scientific review of the UNCCD provisionally accepted set of impact indicators to measure the implementation of strategic objectives 1, 2 and 3" (Orr, 2011) and in document ICCD/COP(10)/CST/2. The main findings of the iterative process related to the set of impact indicators and to the indicator framework are presented below.

I. Set of indicators

2. In order to measure progress in the implementation of strategic objectives 1, 2 and 3 of the 10-year strategic plan and framework to enhance the implementation of the Convention (2008–2018) (UNCCD, 2007), the COP provisionally accepted a recommended minimum, but not exclusive, set of 11 impact indicators (annex I to decision 17/COP.9; see also Orr, 2011: p. 8). Measuring progress thus implies having not only the necessary tools to measure the living conditions of affected populations, the condition of affected ecosystems and the global benefits through effective implementation of the Convention, but also the possibility of tracking their change, and thus discerning trends.

3. Following scientific peer review, a refined set of impact indicators has been presented to the COP (see table below). In order to maximize the indicator set's potential to meet the strategic objectives, the structure of the indicator set hierarchy was refined to allow the distinction between what to measure (general indicators) and how to measure (metrics/proxies). Furthermore, a "readiness scheme" was adopted to include indicators that might currently be challenging to measure, but are viewed as essential to monitoring impact.

4. It should be noted that, as part of the COP decision, a subset of two indicators ("Proportion of the population in affected areas living above the poverty line" and "Land cover status") was identified as the minimum required for reporting by affected countries beginning in 2012 (indicated in bold in the table). The remaining nine impact indicators, while recommended, were considered optional for inclusion in reports by affected countries.

Proposed refinements to the provisionally accepted set of impact indicators contained in annex I to decision 17/COP.9, including metrics/proxies to be considered for testing and/or further assessment/development

Core indicators (with proposed revisions)	*General indicators (revisions of 11 provisional indicators)*	*Metrics/proxies (operational approaches proposed for testing, where ready, and further assessment/development where not)*	*Degree of expert agreement*	*Readiness for testing**
Strategic objective 1: To improve the living conditions of affected populations				
Core indicator S-(1/2/3): Improvement in the livelihoods of people potentially impacted by the process of desertification, land degradation and drought (DLDD)	**III Proportion of the population living above the relative poverty line**	Rural poverty rate**	High	Green
	I Water availability per capita	Percentage of population with access to (safe) drinking water	Medium	Yellow
		Water availability and use	Low***	Yellow
	IV Food consumption per capita	Proportion of chronically undernourished children under the age of 5 in rural areas**	High	Yellow
Strategic objective 2: To improve the condition of ecosystems				
Core indicator S-4: Reduction in the total area affected by DLDD	VI Degree of land degradation	A less complex version of Level of land degradation + Trends in seasonal precipitation	High	Yellow
	VIII Drought index	Trends in World Meteorological Organization Standardized Precipitation Index (SPI) (a meteorological drought index)	(New)	Green
	V Capacity of soils to sustain agropastoral use	GLADIS "soil health status"	(New)	Green
	II Change in land use	Land use (in support of deriving (a) VI Land degradation and (b) XI Land under sustainable land management, and also in interpreting (c) IX Land cover status)	Low***	Yellow
Core indicator S-5: Maintenance of or increases in ecosystem function, including net primary productivity	**IX Land cover status**	Land cover**	High	Green
		Land productivity	Medium	Green
	VII Plant and animal biodiversity****	Crop and livestock diversity (agrobiodiversity)	High	Yellow
		Trends in abundance and distribution of selected species	High	Yellow
		Soil biodiversity	(New)	Red

Core indicators (with proposed revisions)	*General indicators (revisions of 11 provisional indicators)*	*Metrics/proxies (operational approaches proposed for testing, where ready, and further assessment/development where not)*	*Degree of expert agreement*	*Readiness for testing**
Strategic objective 3: To generate global benefits through effective implementation of the UNCCD				
Core indicator S-6: Increases in carbon stocks (soil and plant biomass)	X Carbon stocks above and below ground	Above-ground organic carbon stocks	High	Yellow
		Below-ground organic carbon stocks	High	Red
Core indicator S-7: Areas of forest, agricultural and aquaculture ecosystems under sustainable management	XI Land under SLM	Land under SLM + general indicator VII Plant and animal biodiversity (secondary role) + II Change in land use	High	Yellow
	V Capacity of soils to sustain agropastoral use	GLADIS "soil health status"	(New)	Yellow

* Readiness scheme: Green = ready for testing, Yellow = requires fine tuning, Red = requires further development.

** Although named slightly differently, the operational definition of this indicator is very similar to that given by Berry, L., E. Abraham and W. Essahli. 2009. "UNCCD Recommended Minimum Set of Impact Indicators". Draft report. Consultancy report (1) for the Committee on Science and Technology of the UNCCD. < http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Documents/Final-Report_UNCCD-Min-Set-of-Impact-Indicators.pdf>.

*** As a stand-alone metric/proxy, there was limited or divided support for this metric/proxy. However, if used in support of another indicator, the agreement was much higher.

**** Also a secondary indicator under core indicator S-7.

II. Indicator framework

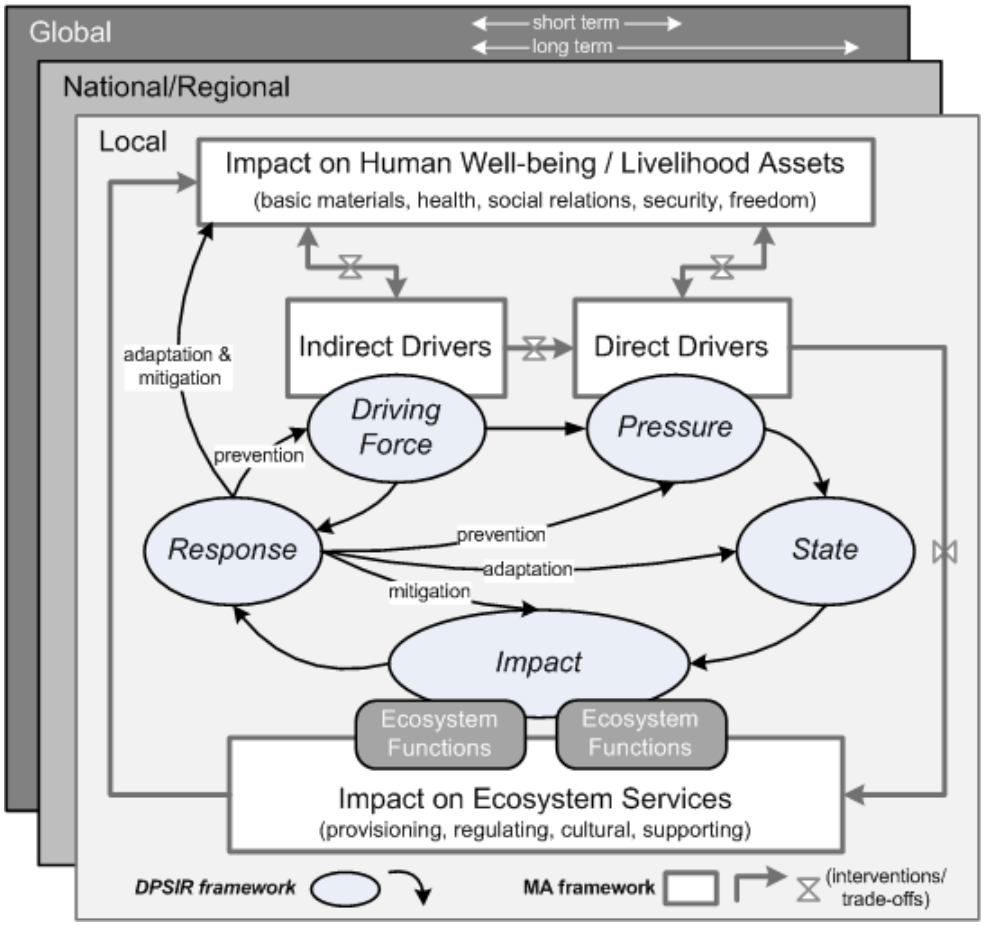
5. In addition to having the capacity to measure trends, indicators have to be linked in order to understand the full complexity of the underlying system and processes that characterize it. A conceptual indicator framework helps to do exactly this.

6. The framework proposed for consideration to conceptualize the provisionally agreed indicator set is basically a combination of previously existing approaches (see figure below):

(a) The DPSIR (Driving Force-Pressure-State-Impact-Response) framework (EEA, 1999; Levin et al., 2008; UNEP/GRID-Arendal, 2002; UNEP-IEA. 2008);

(b) The ecosystem services approach as put forward by the Millennium Ecosystem Assessment (MA, 2005), allowing the different spatial and temporal scales of concern to be visualized.

Amended Driving Force-Pressure-State-Impact-Response framework integrated with aspects of the Millennium Ecosystem Assessment conceptual framework: DPSIR-MA



Sources: adapted from: MA, 2005; FAO-LADA, 2009; GEF KM:Land, 2010.

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Annex III

[English only]

Glossary

I. Terms and definitions

A. Assessment, evaluation and monitoring

1. Assessment: an opinion or a judgement about somebody/something that has been thought about very carefully (*Oxford's Advanced Learners Dictionary*).

2. Evaluation: an opinion of the amount, value or quality of something after thinking about it carefully (*Oxford's Advanced Learners Dictionary*).

3. Monitoring: using a piece of equipment to check or record something (*Oxford's Advanced Learners Dictionary*).

4. According to these definitions it appears that assessment and evaluation are almost synonyms, the first being a little more qualitative and the second a little more quantitative, whereas monitoring does not necessarily involve repeated assessments – any indicator, feature or property of the monitored object with enough sensitivity to capture change of the whole system may be used.

5. If assessments are spatially distributed over large areas, comparability among elementary records should be enabled by displaying them over the whole climate range and by expressing them relative to the potential values expected according to climate condition.

6. Designing monitoring programmes should plan appropriate time windows for recording and time spans between them depending on the variability of the monitored system attributes.

B. Desertification and land degradation

7. The Convention text defines these terms as follows (UNCCD, 1994: Article 1):

(a) "Desertification" means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities;

(b) "Land" means the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system;

(c) "Land degradation" means reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns.

8. However, the Convention definitions contain geographical restrictions when it comes to defining land degradation and desertification, effectively limiting areas under consideration to "drylands", while there has been much argument in recent years regarding the global dimension of land degradation (Cherlet et al., 2012). The UNCCD 1st Scientific

Conference revisited some of the above-mentioned definitions and recommended the modified definition contained in paragraph 9 below.[6]

9. "Desertification" is best treated as an extreme case of land degradation, which is expressed in a persistent reduction or loss of biological and economic productivity of lands that are under use by people whose livelihoods depend on this productivity, yet the reduction or loss of this productivity is driven by that use.

10. While reaffirming drylands as deserving special attention, this revised definition recognizes land degradation as a truly global problem.

11. At the same time, this new definition is not explicit on whether "extreme" should be read as a synonym of "irreversible", which, if that were the case, would be a dangerous and uncertain statement, particularly since the hypothesis of desertification as a fluctuating phenomenon driven by disturbances (the greening effect) is gaining empirical support (Fensholta et al., 2012). More generally, working with definitions that are not sufficiently specific or explicit or that would not allow using system approaches risks hampering progress in successfully addressing desertification/land degradation and drought processes.

C. Desertification syndromes

12. Syndrome: a set of physical conditions indicating a particular disease or medical problem (*Oxford's Advanced Learners Dictionary*).

13. Experience shows that there are associations between desertification symptoms and the particular desertification processes that caused them (Geist, 2005). For example, soil salinization and wetland degradation are symptoms of a failure of the community adaptation to droughts, a well-known desertification syndrome. Desertification syndromes are a useful tool to upscale local to global diagnoses and treatments.

D. Diversity, biodiversity and complexity

14. Diversity refers to lists of species identified in samples with specification of sample size, place and time and containing quantitative information about their respective abundance.

15. Biodiversity refers to the total specific, taxonomic or genetic richness contained in nature or in any local or taxonomic part of it, without considering differences and possible mathematical relations among the representation of the different taxonomic forms.

16. In spite of the spread and omnipresence of the second term, the two above-mentioned terms are complementary and it is useful to keep this condition in mind. The concept of diversity is tightly attached to ecosystem dynamics, while biodiversity can be regarded as a kind of nature dictionary that informs about the genetic repository that can feed diversity at a particular situation in space and time (Margalef, 1997).

17. Complexity is an extension of the diversity concept that concerns the connectivity (food webs and other interactions) that reinforces the ecosystem coherence. It includes a structural component, spatial and temporal, that concerns fluctuations, patchiness, peripheric materials such as wood, dead biomass, nests, etc., as well as genetic and cultural memory to use and maintain such structures (Anand et al., 2010). Referring to the

[6] Dryland Science for Development (DSD) Consortium, Working group 1. Available at <http://dsd-consortium.jrc.ec.europa.eu>).

Convention text and definitions, complexity loss is one of the qualifiers in the land degradation definition. It can be seen as an effort to widen the scope of biodiversity. Associated with the term "degradation", it suggests a loss of "smartness" or fine structure at any scale.

E. Driver or driving force

18. Driver: one of the main things that influences something or causes it to make progress (*Oxford's Advanced Learners Dictionary*). This definition takes the "driver" as external to the "something", which can be a variable or a dynamic system of variables.

19. Looking at the regulation and control theory (Ashby, 1956), this definition can be refined by considering a driver as a disturbance or tension that influences a particular dynamic system, triggering a pressure which causes an impact on a set of essential variables and brings them off the state that allows the system to survive. The affected system cannot influence the driver itself, but it can develop internal reactions to filter or skip its effects. It should be noted that this concept reconciles the cybernetic regulation theory with the DPSIR (Driving Force-Pressure-State-Impact-Response) framework.

20. It is recommended that this conceptual frame be adopted in order to understand and to deal with desertification systems and make progress in the 10-year strategic plan and framework to enhance the implementation of the Convention (2008–2018) (The Strategy) (UNCCD, 2007). Other approaches that distinguish direct from indirect drivers according their immediateness to the biophysical system (MA, 2005) are confusing without helping to better disentangle and tackle the main problems.

F. Harmonization versus standardization

21. Harmonization: to make systems or rules similar in different countries or organizations (*Oxford's Advanced Learners Dictionary*).

22. Standardization: to make objects or activities of the same type have the same features or qualities (*Oxford's Advanced Learners Dictionary*).

G. Indicator

23. Indicator: a sign that shows you what something is like or how a situation is changing (*Oxford's Advanced Learners Dictionary*). This definition implies two conditions for an indicator: first, that the sign is easier to measure than the "something"; and second, that previous knowledge is available to know what the sign forecasts about the change. For example, body temperature is a sign of the subject's health but its significance depends on the observer's knowledge of the temperature ranges for a healthy subject.

H. Primary productivity

24. Primary productivity means the autotrophic input of organic matter to the ecosystem by the photosynthetic building of organic compounds using the atmospheric inorganic carbon dioxide. The result of this process is called gross primary productivity (GPP), in contrast to net primary productivity (NPP), which is the remaining GPP fraction after the respiration of all plant structures (roots, wood, etc.) that are needed by the photosynthetic system but are not directly involved in the photosynthesis.

25. The NPP fraction of GPP diminishes along the ecosystem maturation due to the accumulation of supportive and non-directly productive biomass. At maturity, NPP is minimized so as to just compensate mortality to allow the ecosystem to be maintained in a steady state. This explains why humans need to clear the structure of pristine or mature ecosystems to get part of their NPP.

I. Progress indicator versus narrative indicator

26. A progress indicator is used/intended to track progress of the three strategic objectives formulated in The Strategy, used as part of a set of common, global indicators reported by all Parties.

27. A narrative indicator is used in storylines that are mostly sourced locally. Narrative indicators can be upscaled so that the generic information included can contribute to the information and knowledge base generated across scales (local to global).

J. Scale versus resolution

28. Scale is the relation between the actual size of something and its size on a map, diagram or model that represents it (Oxford Dictionary).

29. Large scale/small scale:

(a) First meaning: involving many people or things, especially over a wide/narrow area (Oxford Dictionary);

(b) Second meaning: drawn or made to a scale that shows a small area of land or a building in great/small detail (Oxford Dictionary);

(c) Note that the two meanings are contradictory. The first is concerned with the magnitude of perceptual scope, while the second is constrained to the physical/geographical concept. In order to avoid them it is recommended that the terms upscaling and downscaling be used only in the first meaning.

30. Spatial/temporal resolution: minimum cell size, length or interval in which each measurement is made. High-resolution: showing much clear, high detail (Oxford Dictionary).

31. There are relationships between scale and resolution: for practical reasons, upscaling (larger area) involves moving towards lower spatial resolution and less detail; and each scale fits to an optimum range of resolutions, which depends on the redundancy imposed by the resolution of the analysed phenomena (del Barrio et al., 1993). For example, 0.01 m resolution may be appropriate to analyse drylands/grasslands patchiness, but would be highly redundant to describe hillslope topography.

32. A completely different issue is the question of how to upscale variables/indicators originally designed at the local geographical large scale. Upscaling has nothing to do with changing to a lower geographical scale, and shows the semantic problems of these two apparently contradictory meanings. The way to upscale variables/indicators is generalizing them around generic processes. For example, take the role of “reactions” in the desertification-threatened system, a cluster of measures to mitigate its impact. One group of reactions may be fostering adaptation by increasing resource storage to buffer drought impact. In a particular site that can be done by building water reservoirs, at another site by building groundwater access facilities, in a third place by keeping ungrazed areas, etc. All these local actions can be upscaled by gathering them around a generic concept, which is

called “resource storage” and is evaluated by the cost or the cost/benefit ratio of any of the actions developed in a variety of sites.

K. Soil organic carbon

33. Soil organic carbon (SOC): a SOC store at a particular moment is an expression of the carbon balance between inputs and outputs from natural and anthropogenic factors. Its metrics are g m-2. Its significance as a carbon sink is limited without knowing those fluxes that determine its balance, but it could be improved by comparing its value to potential. On the other hand, SOC relevance to improving soil functions is widely recognized. Most of organic soil carbon data refer to the percentage of fine earth. Getting SOC values from them requires soil bulk density data, which are much more infrequent.

L. Storyline

34. Storyline: the basic story in a novel, play, film/movie, etc. (*Oxford’s Advanced Learners Dictionary*). In the case of desertification, it refers to the documented history of successes and failures which were experienced by a particular threatened site.

M. Sustainable land management

35. The concept of sustainable land Management (SLM) is the World Bank response to the challenges raised by the Millennium Ecosystem Assessment (MA, 2005). It is defined as a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities) to meet rising food and fibre demands while sustaining ecosystem services and livelihoods (World Bank, 2008).

36. This definition highlights the necessary trade-off between the ecosystem simplification (degrading) associated with agriculture, and sustaining ecosystem services and livelihoods associated with its more advanced stages of maturity. The way to solve this trade-off is still poorly defined but the World Bank seems to focus on improving local good practices, while overlooking the overriding role of regional and global trade (ICTSD, 2007) and policies as drivers of land use at the local level. Indicators to assess SLM are still under discussion and not yet operational.

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