

Prevention and Restoration Actions to Combat Desertification. An Integrated Assessment. PRACTICE Project.

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Abstract

PRACTICE European Commission Seventh Framework Programme project: *Prevention and Restoration Actions to Combat Desertification. An Integrated Assessment*, gathers scientists and stakeholders from most affected regions in the world, in order to learn from ongoing experiences on combating desertification, such as afforestation, improving pastures, controlled grazing, watershed management, and sustainable agricultural practices.

The central goal of PRACTICE is to link science to society in order to share and transfer evaluation methods and practices to combat desertification. To pursue this goal, PRACTICE first aims to develop and implement an integrated evaluation protocol to assess the effectiveness of prevention and restoration practices, applicable worldwide.

PRACTICE assessment protocol assumes the mutual human-environment interactions in land-use/cover change at multiple scales in an integrated manner that simultaneously considers both biophysical and socio-economic attributes. The protocol is based on (1) key common indicators that represent overall ecosystem and human-environmental system functioning, (2) site-specific indicators identified by local stakeholders that are relevant to the objectives and the particular context conditions, and (3) stakeholder perspectives. Indicators are selected in the framework of ecosystem services developed by the Millennium Ecosystem Assessment, focusing on human well-being and trying to be consistent with the UNCCD (CST- Impact Indicators), CBD, and UNFCCC recommendations. Multi-criteria decision models will be used for integrating the information provided by the various biophysical and socio-economic indicators and for integrating the stakeholder perspectives.

Résumé

PRACTICE CE projet (Actions de prévention et de restauration pour lutter contre la désertification. Une évaluation intégrée) rassemble des scientifiques et des intervenants des régions les plus touchées dans le monde, afin d'apprendre des expériences en cours sur la lutte contre la désertification, tels que le reboisement, l'amélioration des pâturages, des pâturages contrôlés, la gestion des bassins versants et des pratiques agricoles durables.

L'objectif central de PRACTICE est de relier la science à la société afin de partager et transférer des méthodes et pratiques d'évaluation pour combattre la désertification. Pour atteindre cet objectif, PRACTICE vise d'abord à développer et mettre en œuvre un protocole d'évaluation intégrée pour évaluer l'efficacité des pratiques de prévention et de restauration, applicables dans le monde entier.

Le protocole d'évaluation suppose la mutuelle interactions humain-environnement dans le changement de l'utilisation et d'occupation des sols à de multiples échelles d'une manière intégrée qui considère simultanément les attributs biophysiques et socio-économique. Le protocole est basé sur (1) les principaux indicateurs communs qui représentent ensemble de l'écosystème et le fonctionnement des systèmes homme-environnement, (2) des indicateurs spécifiques aux sites identifiés par les acteurs locaux qui sont pertinentes pour les objectifs et les conditions du contexte particulier, et (3) les perspectives des acteurs. Les indicateurs sont sélectionnés dans le cadre des services des écosystèmes développée par le Millenium Ecosystem Assessment, en se concentrant sur le bien-être et d'essayer d'être compatible avec le CLD (CST indicateurs d'impact), la CDB, et les recommandations CCNUCC. Modèles de décision multi-critères sont utilisés pour intégrer les informations fournies par les différents indicateurs biophysiques et socio-économiques et d'intégrer les perspectives des parties prenantes.

Context, objectives and structure of PRACTICE assessment approach

Science has made noticeable progress in aiding our understanding of drivers and processes of desertification. Projects and policies of sustainable management and restoration of lands affected by desertification have been applied worldwide,

while exchange of knowledge on the results of such policies and proper assessment of their efficiency have been very limited, compromising the adoption of improved methods of management and restoration.

PRACTICE project aims to provide a method for a participatory and integrated assessment of management and restoration actions to combat desertification. The project has just crossed its first half and will finish in September 2012. This communication is based on the present status of project development which is focussed on the refinement and application of the protocol for participatory evaluation of management and restoration actions, according to the project's schedule.

Figure 1 illustrates the PRACTICE assessment concept, based on the integration of socio-economic and biophysical data to build a system of common indicators of project performance based on the criteria established by scientists and experts, complemented by a set of site, project specific indicators based on the criteria established by scientists and project stakeholders after a process of iterative discussion and knowledge exchange which we refer as social learning. The final set of indicators selected as well as their relative relevancy is decided by this process and is applied to assess the performance of the restoration or management project. Improvement and adaptation of project actions is expected as a result of this process of evaluation.

PRACTICE is presently being applied and tested in different socioeconomic and biophysical contexts and desertification syndromes in specific sites in Africa, Asia, Europe, North America and South America. Table 1 records the location of test sites, their socioeconomic context and the main objective of the desertification control measures applied.

PRACTICE has been designed with the aim to meet the scientific and technical requests stated in the 10-year Strategic Plan and Framework to enhance the implementation of the United Nations Convention to Combat Desertification (UNCCD), specially to develop assessment tools on mitigation and restoration actions to support decision making.

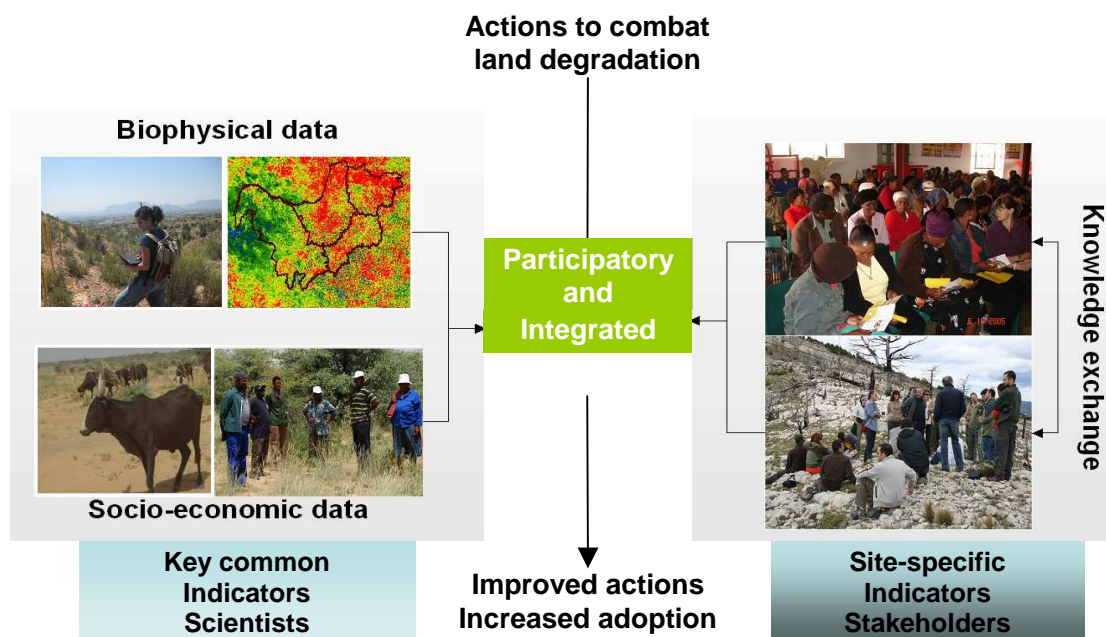


Figure 1 Framework for Evaluation of Actions and Indicator Selection

Figure 1 Cadre d'évaluation des actions et de sélection des indicateurs

Table 1 Location, main land use, and prevention-restoration actions of the sites included in the PRACTICE LTEM platform

Table 1 Localization, principale use des terres et actions de prévention-restoration des lieux inclus dans la plateforme PRACTICE LTEM

LTEM	Country	Main land use	Prevention-restoration actions
Ayora	Spain	woodland, shrubland	wildfire hazard management
Agost	Spain	woodland, steppe grassland	dryland restoration
Albatera	Spain	shrubland	dryland restoration
Lagadas	Greece	woodland, shrubland	grazing and range management
Castro Verde	Portugal	cereal steppes	soil conservation practices
Pula	Italy	woodland, shrubland	wildfire hazard management
Oued Dlim	Morocco	shrubland	dryland restoration
Molopo	S-Africa	grasslands	soil conservation practices
Mier/Alpha (Kalahari)	S-Africa	savanah	soil conservation practices
Paulshoek/Remhoogte	Namibia	shrubland	dryland restoration
Narais/Durchaus	Namibia	savanah	dryland restoration
Nabaos/Gellap Ost	Namibia	shrubland	dryland restoration
Yatir Forest	Israel	woodland	wildfire hazard management
Changling	China	steppe grassland	sustainable grazing
El Castañon	Mexico	grassland	sustainable grazing
El Salado	Mexico	grassland	dryland restoration
El Sauce	Chile	grassland	sustainable grazing
Las Cañas	Chile	woodland and shrubland	sustainable grazing
San Simón	USA	grassland and shrubland	soil conservation practices

PRACTICE set of common indicators for the evaluation of desertification management and restoration projects

The Millenium Ecosystem Assessment (MEA) provides an adequate framework for common indicator selection aimed at the evaluation of projects for ecosystem management and restoration. Additionally, it is focussed in human well-being and consistent with UNCCD provisional set of desertification impact indicators. The selection of indicators relies on an ecosystem services approach and follows the recommendations of United Nations Framework Convention on Climate Change (UNFCC) and United Nations Convention on Biological Diversity (UNCBD). *Table 2* shows the MEA Key Dryland Ecosystem Services, used as a framework for PRACTICE common indicators selection.

**Table 2 Framework for Indicator Selection
Table 2 Cadre de sélection des indicateurs**

Provisioning services	Regulating Services	Cultural Services
<i>Goods produced or provided by ecosystems</i>	<i>Benefits obtained from regulation of ecosystems processes</i>	<i>Nonmaterial benefits obtained from ecosystems</i>
<ul style="list-style-type: none"> ▪ Provisions derived from biological productivity: food, fiber, forage, fuelwood, and biochemicals 	<ul style="list-style-type: none"> ▪ Water purification and regulation ▪ Pollination and seed dispersal 	<ul style="list-style-type: none"> ▪ Recreation and tourism ▪ Cultural identity and diversity ▪ Cultural landscapes and heritage values
<ul style="list-style-type: none"> ▪ Fresh water 	<ul style="list-style-type: none"> ▪ Climate regulation (local through vegetation cover and global through carbon sequestration) 	<ul style="list-style-type: none"> ▪ Indigenous knowledge systems ▪ Spiritual, aesthetic, and inspirational services
Supporting Services		
<i>Services that maintain the conditions for life on Earth</i>		

- Soil conservation development (conservation, formation)
- Primary production
- Nutrient cycling

Inside this framework, PRACTICE Expert Board has made a selection of common indicators to be used in all test sites. They are presented in *Table 3* jointly with some site-specific indicators, which have to be assessed by the stakeholder platform through the participatory process.

Table 3 PRACTICE common indicators
Table 3 Indicateurs communs de PRACTICE

Criteria		Indicators / Proxies
Economy	Income, personal wealth	Site-specific
Provisioning Services	Goods (food, fiber, timber, fuel wood...)	Productivity Productivity value
Regulating & Supporting Services	Water and soil conservation	Plant cover & pattern Soil surface condition
	C sequestration	SOC Above-ground biomass
Cultural Services	Landscape and cultural heritage	Site-specific
Biodiversity		Diversity of vascular plants

Once MEA and UNCCD criteria are guaranteed, the common indicators and the metrics to characterize them have been selected with the main criteria of relevancy and applicability in every site, with the minimum local resources and technology available. PRACTICE also includes the option of Remote Sensing assessment where suitable and available.

PRACTICE local indicators selection. Adoption of the final set of indicators. Establishment of Multi-Stakeholder Platform (MSHP) and participatory evaluation

Local indicators are selected by the stakeholders of each side. Besides the establishment of the indicators on the criteria *income, personal wealth, and landscape and cultural heritage*, referred in table 3 as site specific, the MSHP are expected to identify and select site-specific criteria and indicators and to establish the relative importance (weight) of the whole set of indicators selected. This is performed in an interactive and iterative process of communication in which scientists, technicians, policy makers, managers, local users as farmers, hunters, tourist local entrepreneurs, conservationists, and representatives of any group of interest in relation to the project of restoration or sustainable management, exchange points of view and perspectives in a process of social learning. The final result is a set of indicators, common and local, weighed in relevancy to be applied in the evaluation of the site-specific projects.

Procedures for MSHP constitution and working methodology for indicator selection and weighing are established and described in detail in the PRACTICE protocol.

The PRACTICE protocol for participatory evaluation involves four steps. Though the steps are sequential in nature, they can be conducted in as many as four stakeholder interaction events, or as few as two. The first three steps have been developed, tested and are now being piloted in the sites. The fourth step is under development.

Steps:

- 1) Stakeholder identification and engagement
- 2) Baseline evaluation of actions and indicator selection
- 3) Indicator weighting (linked to multi-criteria decision analysis)
- 4) Integrated evaluation of actions

1) Stakeholder identification and engagement aims to provide a flexible but guided approach to involve a comprehensive and representative set of stakeholders who can contribute to the evaluation process. It consists of three main elements: *consent* (for stakeholder participation in all information gathering/recording aspects of the process), *guidelines* (for semi-structured interviews with examples of questions) for assessing, and eventually engaging, stakeholder potential as part of each site-specific multi-stakeholder platform, and *contact data*. This step can be implemented as a first single step or in combination with step 2.

2) Baseline evaluation of actions and indicator selection aims at capturing the baseline stakeholder perspectives on the desertification mitigation/ restoration *actions* applied (including on no-action control areas), and the baseline stakeholder views on site-specific *indicators* for evaluation actions.

Both steps 1 and 2 are meant to be implemented through individual semi-structured interviews.

3) Indicator weighting aims to establish both individual and integrated stakeholder perspectives on the relative importance of the indicators selected. These collective weights will be incorporated into a Multi-Criteria Decision Analysis (MCDA) applied to each site-specific field database on the selected indicators. The local stakeholders (including local researchers) will provide an assessment on the relative importance of the whole set of selected indicators, which will include indicators suggested by other local stakeholders and the common indicators suggested by PRACTICE expert board. Therefore, this step 3 represents the first opportunity within PRACTICE participatory process for both knowledge exchange / social learning and the integration of scientific and local knowledge. Furthermore, this step 3 provides inputs to the research teams in PRACTICE in order to perform site-specific and global MCDA of data on the actions applied.

There are several approaches and methods available for the indicator weighting process. The “Pack of Cards” revised method was discussed, adopted and applied in the sites.

4) Integrated evaluation of actions aims to encourage the sharing and discussing of the results from the site-specific MCDA analysis performed, and a re-evaluation of the actions applied to combat land-degradation according to these results. This step also aims to promote dissemination of what was learned among stakeholders at each site, and ultimately between PRACTICE sites and the larger desertification community through collaborative tools provided on the PRACTICE public website (www.ceam.es/practice).

The specific tools for this step are currently being developed

Sections 3 & 4 can be implemented through individual interviews or during a collective exercise, though a much greater impact is expected from a collaborative process. Therefore a collective exercise is proposed to fully meet PRACTICE goals of knowledge exchange and social learning.

Example of preliminary application of PRACTICE assessment protocol, Agost watershed, Alicante, Spain.

Agost (Ventós) watershed (*Figure 2*) is located in the South East Spanish province of Alicante and provides a good example of extensive restorations made in the semi-arid Mediterranean in Spain along the 20th century.

The 1600 hectares of the watershed comprises five types of restoration actions (*Figure 3*)

- 1) No action, alpha grass (*Stipa tenacissima L.*) steppe on South-facing slopes
- 2) Aleppo pine plantation (*Pinus halepensis L.*) during several phases between 1950 and 1965 on North-facing slopes
- 3) Aleppo pine plantation, in several phases (1975-1990) on South-facing slopes
- 4) Recharge check-dam at the outlet of the watershed. A small aquifer, which provides water supply to Agost is located under the watershed and their limits are coincident.
- 5) Check-dams on creeks and gullies to limit channel erosion and mitigate effects of flash floods typical of the area.



Figure 2 *Ventós catchment (1600 ha)*
Figure 2 *Basin de Ventós (1600 ha)*

MSHP was established according to the defined procedures. *Figure 4* describes the composition of MSHP. *Figure 5* illustrates the overall opinion on the actions and *Figure 6* provides an example of the identification of positive and negative outcomes of every action, as part of the baseline evaluation.

AGOST site: Actions



NO action. Alpha-grass steppe without reforestation, S-facing slopes.



Aleppo pine plantation (50s-60s), N-facing slopes



Aleppo pine plantation (70s-90s), S-facing slopes



Recharge dam



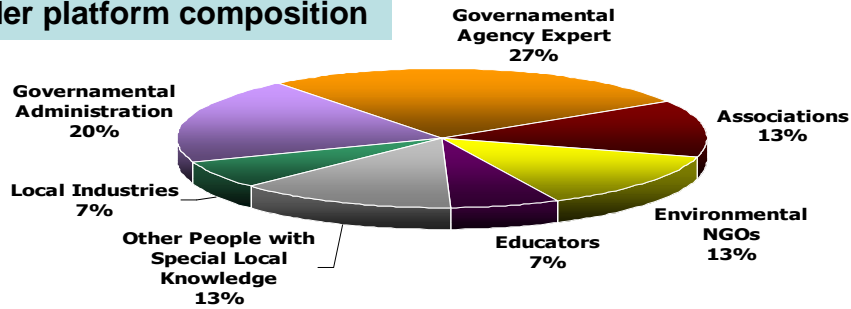
Dams on creeks and gullies

Figure 3 *Different actions in Ventós catchment*

Figure 3 *Differentes actions sur le bassin versant Ventós*

Step 1: Stakeholder identification

Stakeholder platform composition



Category Subcategory	Stakeholders involved
Gov. Administrations: <i>Elected Officials</i>	Agost Major
Gov. Administrations: <i>Civil Servents with Knowledge</i>	Current environmental coordinator
Governmental Agency Experts: <i>Forestry</i>	Department of Environment
Associations: <i>Recreation</i>	Hunting Association
Associations: <i>Cultural</i>	Miren per Agost
Environmental NGOs	Ecologistas en Acción
Educators	Agost High school
Other People with Special Local Knowledge	Past Environmental Coordinator
Local Industries	Pottery Industry owner

Figure 4 Stakeholder platform composition

Figure 4 Composition de la Plate-form des parties prenantes

Step 2: Baseline evaluation

Overall opinion on the actions

Do you think this action has been a good choice? On a scale of 1 to 5, where 1 is "very bad choice" and 5 is "excellent choice," how would you rate this action?

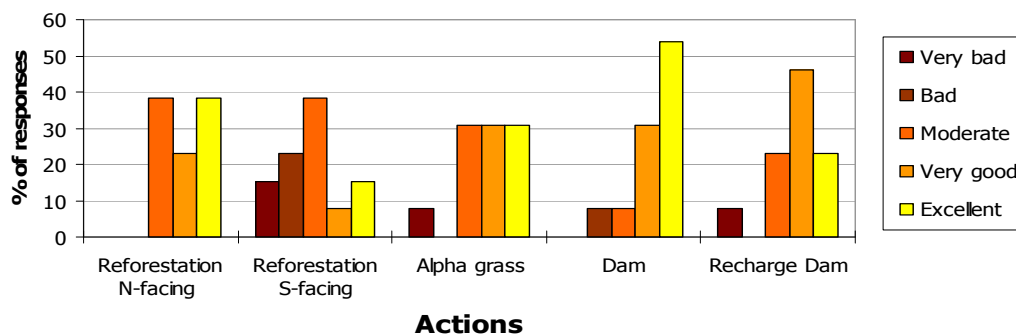


Figure 5 Overall opinion on the actions

Figure 5 Opinion générale sur les actions

Dam on creeks		Forestation on the south slope	
Positive	Negative	Positive	Negative
Avoid floods	Visual impacts (Not integrated with the landscape)	Stop erosion	Lack of plant diversity (monospecific)
Labor		Sequestration of CO ₂	Increase erosion (machine for subsoiling)
Avoid soil erosion		Avoids loosing organic matter of soil	Risk of fire
Recharge of the aquifer			
No negative outcomes			

Figure 6 Positive and negative outcomes

Figure 6 Résultats positifs et négatifs

The task of indicator identification and characterisation through the data set collection for indicator approximation was performed in each of the four actions. *Table 4* provides the criteria, indicators, units and values for the action 2) Aleppo pine plantation in North-facing slopes.

Landscape Unit Data Base				
MEA Category	Criteria	Indicator	Units	Old afforestation
Provisioning services	Soil Organic Content	Organic Carbon	%	2,00
Regulating services	Sediment delivery	Erosion rate	Kg m ⁻² año ⁻¹	0,005
	Climate regulation	Phytomass volume	m ³ m ⁻²	4,85
Biodiversity	Richness of species (vascular plants)	Total number of species in the inventory	N	34
	Endemic, rare and endangered plants	Number of endemic, rare and endangered plants by inventory	N	4,0
	Game species	Preference of habitat for game	UR	+
Provision services	Total biomass	Total biomass	Kg ha ⁻¹	9473
	Forage production	Forage production	UF ha ⁻¹ año ⁻¹	253
	No timber forest products	Abundance of plants with artisanal and food forward, by inventory	%	
	Aromatic and medicinal plants	Abundance of aromatic and medicinal plants, by inventory	%	
	Fresh water production	Water retained	%	11
Cultural services	Attractive landscaping	Aesthetic value	UR	5,8
	Relevance of traditional cultural	Cultural value	UR	4,4
Economic benefits	Income from crops	Income from crops sales in origin	€ ha ⁻¹ año ⁻¹	0
	Employment	Labour force	Wages ha ⁻¹ año ⁻¹	0,7

Table 4 Landscape Unit Data Base
Table 4. Base de données des Unités de Paysage

PRACTICE assessment protocol in the context of desertification policies and plans

PRACTICE is not fully developed yet, nor fully tested, it is now in the half of the three years of project development. From this starting point, some reflections could nevertheless be made about the potential role of this tool and the place it might occupy in the evaluation policies, programmes and projects on combating desertification.

Clearly it might complement the established objective methods of project evaluation from a participatory subjective point of view. Also it seems that PRACTICE might have a role for the participatory evaluation of plans and policies to combat desertification, provided that the structure of the assessment tool should be adapted according to this change of scale. All along the philosophy of UNCCD development, the attribute of integration of projects, policies and plans is reiterated and so is the bottom-up approach in the design of feasible solutions targeted to the stakeholders. Probably this attribute of the PRACTICE approach jointly with its architecture which assesses and integrates both environmental sustainability according to UNCCD, UNFFC and CBD and social perspectives might be the main contribution for policy and plans evaluation.

Furthermore the potential to move from assessment to design is implicit. PRACTICE may constitute an element for the formulation of environmentally sound and socio-economically integrated projects and plans on desertification mitigation. In this sense the input of the participatory process could be easily related to the assessment and adoption of project alternatives playing a role of efficient project public information.

If the above options have to be explored it should be done in parallel with PRACTICE development. Analysis of site results must run in parallel and communication with potential users is essential. So project staff envisages the development of a communication piece with the experience of the sites and the functioning of the protocol fitted for discussion with managers and policy makers at national level.