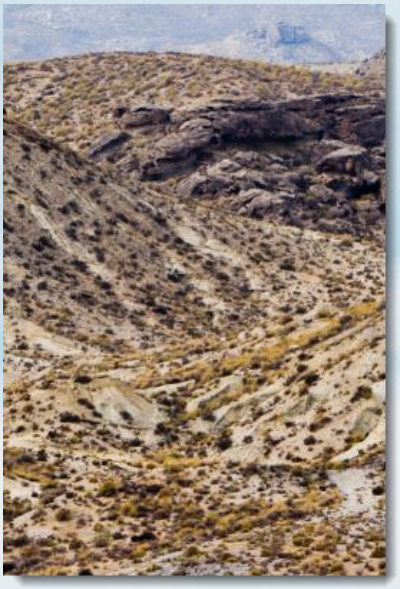
CASCADE
Catastrophic shifts in drylands:
How can we prevent ecosystem degradation?

CASCADE REPORT series



Documented and evaluated natural resource management practices

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October 29th, 2014
Report number 05
Series: Scientific reports

Deliverable 7.1

DOCUMENT SUMMARY	
Project Information	
Project Title:	Catastrophic Shifts in drylands: how can we prevent ecosystem degradation?
Project Acronym:	CASCADE
Call Identifier:	FP7 – ENV.2011.2.1.4-2 - Behaviour of ecosystems, thresholds and tipping points
Grant agreement no.:	283068
Starting Date:	01.01.2012
End Date:	30.09.2015
Project duration	66 months
Web-Site address:	www.cascade-project.eu
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Deliverable Information	
Deliverable Title:	Documented and evaluated natural resource management practices
Deliverable Number:	D.7.1
Work Package:	WP7
WP Leader	*Centre for Development and Environment CDE, University of Bern, Switzerland*
Nature:	Public/Restricted
Author(s):	Gudrun Schwilch, Matteo Jucker Riva, Hanspeter Liniger
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Date of Delivery	October 29, 2014

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14	FUNDACION CENTRO DE ESTUDIOS AMBIENTALES DEL MEDITERRANEO	CEAM	Spain

Deliverable D7.1

Documented and evaluated natural resource management practices

Selective forest clearing to prevent large forest fires

Spain - Clareo selectivo para la prevención de incendios (tratamientos selvícolas) (Spanish)

Selective forest clearing aims in reducing the connectivity and the amount of (dead standing) fuel, as well as reducing the competition between regenerating pines, in order to prevent forest fires and to ensure the growth of a healthy forest.

The forests in the Ayora region experienced a huge disturbance in the past, such as deforestations, removal of key species, land abandonment, dense growth of fire-prone seeder species (high continuity of dead standing fuel), missing management, wildfires and dense afforestations. These disturbances resulted in the degradation of the vegetation, the reduction of the resilience of the ecosystem against fires and thus an increasing risk of wildfires. After fires, many landscapes regenerated with a high and continuous fuel accumulation with few native resprouter species, which made it extremely difficult to control forest fires. The dense growth not only increased the risk of wildfires but also the competition between different species (nutrients, light, space). Therefore appropriate vegetation management to increase the resilience of the ecosystem to fires and to reduce competition is crucial.
These problems are approached by selective forest clearing. The main purposes of thinning dense pine forests are the prevention of fires by reducing the fuel load and its continuity, and to improve pine regeneration by eliminating the competition between different species. As a result, the quality of the plants is improved and the amount of dead or sick plants is reduced, which is essential to ensure a healthy forest. This also leads to a higher resistance to pests which in turn again decreases the risk of fire (less dead plants). Vegetation removal produces fresh vegetation growth, therefore more diverse and nutritious fodder is provided to animals (game and livestock) in the cleared areas which is a benefit for herders. Also wild animals use this fodder supply which in turn hinders them to destroy cultivated fields of the farmers. Furthermore, honey producers make use of the enhanced growth of shrubs and the additional space created by selective clearing to place their beehives and to increase honey production. Especially during the current economic crisis forest management is an important source for jobs - most of the workers were unemployed before working in the selective clearing. Through the clearings, fuelwood is gained and offered to retired people for

left: Cleared forest with chipped material applied as mulch and fresh grasses providing fodder to animals. (Photo: Nina Lauterburg)
right: The residues generated by forest clearings are chipped in-situ using brushcutters (motodesbrozadoras). The chipped material protects the soil as a mulch layer. Forest management provides jobs - many forest workers were unemployed before. (Photo: Nina Lauterburg)

Location: Spain, Valencia
Region: Ayora/Jarafuel
Technology area: 0.5 km²
Conservation measure: vegetative
Stage of intervention: prevention of land degradation
Origin: Developed externally / introduced through project, recent (<10 years ago)
Land use type:
Forests / woodlands: Natural
Forests / woodlands: Plantations, afforestations
Climate: subhumid, temperate

29 October 2014 (final version)

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1. Introduction

The overall aim of WP7 of the CASCADE project is the formulation of effective and sustainable natural resource management options. Before inventing new natural resource management measures it is economic and worthwhile to identify existing practices which are already preventing (or reversing) dramatic ecosystem shifts. Effective and sustainable natural resource management depends on suitable technologies and associated implementation approaches, and on flexibility and responsiveness to changing complex ecological and socio-economic environments. In Task 1 of WP7, these existing management practices were now identified, documented and assessed using the standard WOCAT format. This is the basis for an in-depth study on sustainability and resilience of land management practices vis-à-vis ecosystem thresholds and shifts, which will lead into the development of a 'resilience tool' for land managers (Task 2 of WP7). Finally, in Task 3 of WP7, the documented management practices of Task 1 and the insights from Task 2 will facilitate the development of comprehensive guidelines with region- and ecosystem-specific recommendations and principles for natural resource managers. These guidelines will include the technical practices and implementation approaches elaborated within this deliverable.

In order to maintain (or enhance) the natural resource base and sustain productivity and biodiversity, it requires maintaining the vital ecosystem functions, including resilience to climate change, disasters and other threats and risks. The assessment of natural resource management options therefore includes impacts on ecosystem functions and services, following the Framework provided by the Millennium Ecosystem Assessment, which distinguishes provisioning, regulating, cultural and supporting services of ecosystems. The assessment includes information on costs and benefits of natural resource management measures, and on their appreciation by stakeholders concerned. Rehabilitation measures are equally included with prevention and mitigation measures, highlighting the potential to reverse catastrophic shifts.

The specific activities of this task were:

(1) To document and evaluate each identified locally applied technology and approach in a structured and standardized way;

(2) To guarantee a certain level of data quality through a review and quality assurance process; and

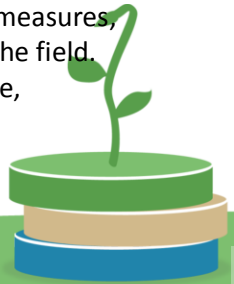
(3) To enter this information into the WOCAT database in order to share it with other sites as well as globally.

The documentation and evaluation was done with the WOCAT basic questionnaires on Sustainable Land Management (SLM) technologies and approaches, which are available on the WOCAT website (www.wocat.net). These come along with an online database system. The questionnaires are available in some of the CASCADE study site languages, such as Portuguese and Spanish.

2. Methodology

The questionnaires provide a framework for documentation and evaluation and guide the user through all relevant aspects of SLM. By filling in the questionnaires the contributor not only documents knowledge and establishes a database, but also reviews and evaluates the SLM practice. The know-how is tapped from several sources and interaction is stimulated during the documentation and evaluation process.

Strategies to be documented consist of technical measures as well as implementation approaches. SLM Technologies are understood as agronomic, vegetative, structural and management measures, or combinations of measures, that control land degradation and enhance productivity in the field. The questionnaire on technologies addresses the specifications of the technology (purpose,



classification, design and costs) and the natural and human environment where it is used. It also includes an analysis of the benefits, advantages and disadvantages, economic impacts, acceptance and adoption of the technology. SLM Approaches are ways and means of support that help to introduce, implement, adapt and apply SLM technologies on the ground.

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

Researchers assessing and discussing SLM technologies with a forester in Ayora, Spain (Photo by Hanspeter Liniger)

3. Completed working steps

1. Methodological trainings were organised in April 2013 as well as in April 2014 (in collaboration with COST actions ES1104 “Desertification hub”) to teach study site partners in the use of the WOCAT methodology. In 2013 two persons participated from Greece and Portugal and in 2014, a CASCADE person from Cyprus was among the participants. The other study site teams were directly trained by CDE researchers in their respective country.
2. A geographical database was created for each case study area, with spatial information on land use and on the geography/environment of the area.
3. At each study site a CDE researcher conducted 2-3 weeks of field work in collaboration with the study site partners and in direct contact with local stakeholders to identify land use-related problems (as perceived by stakeholders) and already applied SLM practices.
4. The study site teams were then responsible to document these jointly identified SLM practices with the WOCAT questionnaires and enter the data into the online database system.
5. CDE researchers reviewed the uploaded data and study site teams complemented the information based on the feedback.

Stakeholders contacted at the study sites included:

- Land users and land owners: animal farmers, crop farmers, owners of forest patches

- Land managers: forestry service workers, firemen, agricultural advisors / technicians
- Local administrators: mayors, water authority directors, forest management directors
- Other stakeholders: former land users, inhabitants of the area, experts in land use related topics or experts in local history.

4. Resulting databases

All study sites have entered their documented technologies and approaches into the WOCAT database.

Overall, there are **20 technologies** and **3 approaches**, as listed in the tables below. The SLM technologies can be accessed on https://qt.wocat.net/qt_search.php and the SLM approaches on https://qa.wocat.net/SelectApproach.php

Table 1 SLM technologies database.

Study site	Code	Name of technology	Lead author
Portugal	T_POR001en	Primary strip network system for fuel management (fire breaks)	Coelho, Celeste
Portugal	T_POR003en	Post-fire Forest Residue Mulch	Prats, Sergio
Albatera, Spain	T_SPA013en	Multi-specific plantation of woody species	Bautista, Susana
Albatera, Spain	T_SPA014en	Aleppo pine plantation on terraces	Bautista, Susana
Albatera, Spain	T_SPA015en	Spatially diverse multispecific plantation	Bautista, Susana
Ayora, Spain	T_SPA009en	Cleared strip network for fire prevention (firebreaks)	Lauterburg, Nina
Ayora, Spain	T_SPA010en	Selective forest clearing to prevent large forest fires	Lauterburg, Nina
Ayora, Spain	T_SPA011en	Selective clearing and planting experiment to promote shrubland fire resilience	Lauterburg, Nina
Ayora, Spain	T_SPA012en	Afforestation with Pinus Halepensis after the fire of 1979 (La Molinera)	Lauterburg, Nina
Castelsaraceno, Italy	T_ITA003en	Pasture manuring (application of manure from shelter)	De Paola, Velia
Castelsaraceno, Italy	T_ITA004en	Ploughing and seeding of fodder species to recover degraded grazing areas	De Paola, Velia
Castelsaraceno, Italy	T_ITA005en	Metallic fences to prevent damages to pastures from wild boars	De Paola, Velia
Castelsaraceno, Italy	T_ITA006en	Cutting of ferns	De Paola, Velia

Castelsaraceno, Italy	T_ITA007en	Unvegetated strips to reduce fire expansion	De Paola, Velia
Castelsaraceno, Italy	T_ITA008en	Selective cutting	De Paola, Velia
Crete, Greece	T_GRE008en	Graze land forestation with Ceratonia siliqua (carob trees) in the Mediterranean	Daliakopoulos, Ioannis
Crete, Greece	T_GRE009en	Cypress afforestation by state	Daliakopoulos, Ioannis
Crete, Greece	T_GRE010en	Integrated water-harvesting and livestock water-point system	Daliakopoulos, Ioannis
Randi, Cyprus	T_CYP001en	Fodder provision to goats and sheep to reduce grazing pressure on natural vegetation	Christoforou, Michalakis
Randi, Cyprus	T_CYP002en	Planting carrob and olive trees	Christoforou, Michalakis

Table 2 SLM approaches database.

Study site	Code	Name of technology	Author
Portugal	A_POR001en	Forest Intervention Area (ZIF)	Coelho, Celeste
Ayora, Spain	A_SPA002en	Plan of preventive silviculture (PSP): implementation of firebreak network within a forest intervention area (ZAU)	Lauterburg, Nina
Castelsaraceno, Italy	A_ITA001en	Municipal Forest Management Plan (Decade 2010-2019)	De Paola, Velia

5. Challenges and difficulties encountered

In the study sites where the land ownership and land management is private the main difficulty (and the first objective of the field work) has been the identification of SLM practices. Finding these SLM practices was challenging for two reasons: a) most of these practices are widespread and thus not regarded as SLM practices by the local people (they are identified as "the standard way") and b) some SLM practices are only implemented by a single farmer / land user without any type of collaboration with local administrators or other land users.

For the same reasons it has been difficult to obtain quantitative data about benefits and negative impacts, even when these directly affected land users. In general, SLM technologies comprising management measures have been the most difficult to identify and assess compared to technologies with agronomic, vegetative or structural measures.

Another difficulty has been that the sites identified by the other workpackages of CASCADE do not directly relate to the identified SLM practices in WP7. For example, the plot selection in WP3 was done based on level of stress, not level of land management. Land management might influence the level of stress, but this link is not straightforward as level of stress can also be influenced by other factors. For forest fires, for example, the level of stress is determined by the recurrence interval of

fires, which can partly be influenced by land management, but which is also influenced by e.g. drought and chance ignition. Therefore, it is difficult to compare with the documented technologies or to use the data of WP3 for our analysis. However, we foresee a connection with the restoration sites of WP5 and this will further be elaborated in the remaining tasks of WP7.

According to Lauterburg (2014), who documented the case studies in Ayora, Spain, there were some specific challenges to apply the WOCAT questionnaires in the context of forest fires in Europe. Due to the fact that only few land users are still living or working in this abandoned area it was a challenge to find stakeholders with a broad knowledge of the region who could contribute to complete the questionnaires. Furthermore, different from SLM implemented by small-scale farmers in other countries, there is no single person who established a technology and who is able to provide all the required data. Therefore, information had to be collected from many different sources, for example from various stakeholders met in the field, project documents from the government, scientific knowledge from the university, and analysis of existing maps. Unfortunately, this resulted in different and sometime contradicting answers to the same questions. But once the information was collected, which was highly time intensive, the technology questionnaire was suitable to document the SLM practices comprehensively.

6. Conclusion and outlook

The work with the WOCAT questionnaire was demanding for the study site teams, but also very enriching and giving many new insights into applied SLM technologies and approaches. It was also a good opportunity for the study site teams to get in contact with the local stakeholders.

Land managers have shown a lot of interest in the documentation of their SLM experience, in particular when it facilitated the exchange of knowledge among different experts at the same time. For example, they acknowledged that experience was exchanged between firemen and forest workers. In general the more proficient a stakeholder/ land user was, the more he was willing to contribute and in favour of a tool like WOCAT. However, only in a few cases land users directly expressed the need for more information/technical knowledge. To this moment it is not possible to say how the land users and other stakeholders will be using the results of this SLM practices inventory. The contributing stakeholders were generally interested in the results, but ways and means still have to be worked out with the case study partners to ensure that the results can be shared with and used by those stakeholders.

In any case, the greatest value is the consolidation of the previous scattered knowledge into one documentation. Through the standardized documentation these case studies are now comparable and exchangeable throughout all CASCADE sites and even worldwide.

This work of WP7 is also strongly linked to the other WPs, namely WP5, WP6 and WP8. As mentioned above, there is a direct link with the restoration assessment in WP5 and the SLM practices in WP7. The modelling work of WP6 provides information about the kind of measures that would be promising and delivers indications on the recovery potential. On the other hand, WP6 benefits from information about how the land users adapt to degradation and/or change the way they exploit the ecosystem. Finally, WP8 heavily builds on the results of WP7, whereof this deliverable is the first achievement.

7. References

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