



# RESTORATION ACTIONS TO COMBAT DESERTIFICATION IN THE NORTHERN MEDITERRANEAN

**Second Annual Report**  
January 2004 – December 2004

Executive summary

Project Co-ordinator: **Dr. V. Ramon Vallejo (CEAM)**  
Contract number: **EVK2-CT2002-80025**  
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## **Second Annual Report**

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## EXECUTIVE PUBLISHABLE SUMMARY

<b>Contract n°</b>	EVK2-2002-00538	<b>Reporting period:</b>	January 2004 – December 2004
<b>Title:</b>	RESTORATION ACTIONS TO COMBAT DESERTIFICATION IN THE NORTHERN MEDITERRANEAN (REACTION)		
<p><b>Objectives:</b></p> <p>REACTION aims at establishing a database on land restoration to fight desertification by inventorying and evaluating well-documented restoration projects in the Northern Mediterranean, at facilitating access to high quality information to forest managers, policy-makers, and other stakeholders, and at providing restoration guidelines in the light of a critical analysis of contrasted past and innovative techniques.</p> <p>Main specific objectives for the reporting period were:</p> <ol style="list-style-type: none"> <li>(1) To complete the project inventorying process by collecting and compiling the information available about the selected restoration projects.</li> <li>(2) To organise the second REACTION workshop on “Restoration actions to combat desertification: achievements and gaps”.</li> <li>(3) A peer review – by the REACTION Advisory Panel– of the evaluation criteria and database implementation and the minimum information required for database quality.</li> <li>(4) To define the contents and structure the REACTION database; to deploy an Internet-based facility that allows the users to retrieve and query the data information stored; and to introduce the revised questionnaires in a common template managed by the co-ordinator.</li> </ol> <p><b>Scientific achievements:</b></p> <p>REACTION created a fully functional structure that ensures exchange and dissemination of information and technology and quality assurance through interaction of partners, Advisory Panel, external Steering Committee of Focal Points, and National Working Groups.</p> <p>Along the reporting period, REACTION partners, in close collaboration with National Working Groups, obtained and compiled the information available about more than forty (40) restoration projects, and performed a preliminary evaluation of the compiled projects. The inventory of evaluated projects and the amount and quality of the information compiled are absolutely innovative achievements in the framework of the dissemination and transfer of technology of restoration activities.</p>			

REACTION workshop on **Restoration actions to combat desertification: achievements and gaps**, held in Thessaloniki (Greece) on 23<sup>rd</sup>-25<sup>th</sup> September 2004, reviewed the inventoried restoration projects and discussed the results from project evaluation. Major achievements and gaps of past restoration projects in the Mediterranean countries were discussed. Updated REACTION web page and database were also presented.

The set of **restoration projects compiled and evaluated** focuses on long-term successful restoration projects in the Northern Mediterranean and covers a wide range of restoration projects in terms of dates, technology applied, vegetation type, climate, etc. The main goal of most of the past restoration projects were prevention of soil erosion and flooding. Current quality of the restored sites, according to REACTION indicators, is highly variable. The landscape, socio-economic and cultural values of the sites greatly improved in all cases. Site constraints and site management need to be analysed as potential factors underlying differences in quality. The specific history of each country and region has to be taken into account in the evaluation of long term reforestation efforts.

Peer review by REACTION Advisory Panel of the evaluation criteria and the minimum information required for database quality was very positive. The reviewers highlighted that REACTION methodology covers a good range of ecological, socio-economic and cultural criteria for restoration success, over an appropriate range of spatial scales.

We defined and implemented in computing facilities the **REACTION database** of restoration projects, which has been designed to be an on-line and open-access database. The Query system –that allows the search of restoration projects by country, bioclimate type, restored ecosystem, age, size, scope of the project, and objectives– was successfully tested. Major innovations of the REACTION database are the large amount of detailed information compiled on well-documented restoration projects at stand and landscape scales; the evaluation of project results, including structural and functional quality, and technical, ecological, and socio-economic perspectives; and the regional (Mediterranean) scope.

**Dissemination** of information is a key point of REACTION project. During the reporting period, the following activities greatly contributed to this task:

- Seminars and meetings with stakeholders and experts at national scale and International Second REACTION workshop.
- Update of REACTION web page and its dissemination through a number of distribution list.
- Link between REACTION web page and EU-MEDIN portal.
- A number of publications and contributions to several meetings and workshops (see Annex 5: publication list).
- Organisation of the Symposium “Criteria and Methodologies for Evaluating Restoration Projects” in the framework of the 17<sup>th</sup> Conference of the Society of Ecological Restoration International, to be held in Zaragoza, Spain, September 2005.
- Design of the Advanced REACTION Course on Land Restoration, to be developed in 2005.

**Socio-economic relevance:**

REACTION project has created a suitable structure and a database/evaluation system that contribute to filling existing gaps in the availability of information on restoration actions, evaluation techniques, transfer of technology, and communication among agencies, regional administrations, and countries.

**Conclusions:**

Progress made by REACTION project contributes to disseminate good practices successfully proved in past restoration projects, harmonise criteria and methodology for the evaluation of restoration projects, and facilitate access to high quality information to the various stakeholders.

**Keywords:** Ecosystem restoration, Evaluation and monitoring, Mitigation of desertification, Restoration database

**Publications:**

- Alloza, J.A., Bautista, S., & Vallejo, V.R. 2004. Evaluación de resultados en las repoblaciones. En V.R. Vallejo y J.A. Alloza, eds., *Avances en el estudio de la gestión del monte mediterráneo*, pp. 437-482. Fundación CEAM (*in Spanish*).
- Bautista, S., Alloza, J.A., & Vallejo, V.R. 2004. Conceptual framework, criteria, and methodology for the evaluation of restoration projects. The REACTION approach. CEAM Foundation ([www.gva.es/ceam/reaction](http://www.gva.es/ceam/reaction)).
- Scotti, R., d'Angelo, M. & Marongiu, M. 2004. REACTION: Recupero e valorizzazione delle "buone pratiche" tecniche di restauro ecologico dall'esperienza dei forestali. 14<sup>th</sup> Meeting of the Italian Society of Ecology. Siena 4-6 October 2004. (*Abstract in English*).
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- Alloza, J.A. & Vallejo, V.R. Forest Restoration. R&D Programme of the CEAM Foundation. Advanced Course on Forest Fire Prevention. Ministry of Environment. March 2004. Liria, Valencia, Spain. (*in Spanish*).
- Vallejo, V.R. 2004. REACTION Project. Review meeting on desertification research in the European Union. European Commission. Brussels 5-7 July 2004.
- Vallejo, V.R., Bautista, S., Delgado, J.C., Aradottir, A. & Rojas, E. 2004. Strategies for land restoration. In: Enne, G., Peter, D, Zanolla, C & Zucca, C. (eds.), MEDRAP Concerted Action. Workshops results and proceedings, pp. 774-752. NRD, Sassari, Italy.
- Aronson, J., Vallauri, D. & Fontaine, C. 2004. The problem of evaluation and monitoring. In: Enne, G., Peter, D, Zanolla, C & Zucca, C. (eds.), MEDRAP Concerted Action. Workshops results and proceedings, pp. 778-786. NRD, Sassari, Italy.

## **Annexes**

1. REACTION Inventory of Restoration Projects (preliminary version)
2. REACTION Database: Query and Result pages
3. Peer Review of the REACTION Conceptual framework, criteria, and methodology for the evaluation of restoration projects.

## ANNEX 1.

### REACTION Inventory of Restoration projects to Combat Land Degradation (Preliminary version).

NAME	LOCATION	BIOCLIMATE	GENERAL OBJECTIVE	SIZE (HA)	DATE (*)	RESTORED ECOSYSTEM
Los Valles	Valencia, E Spain	Semiarid	Erosion and flood control	470	1960	<i>Pinus halepensis</i> forest
Pinaroto	Teruel, E-Central Spain	Semiarid	Timber production, increase of forest surface	300	1952	<i>Pinus sylvestris</i> forest
Periago	Murcia, SE Spain	Semiarid	Erosion and flood control	1650	1952	<i>Pinus halepensis</i> forest
Espuña-1	Murcia, SE Spain	Sub-humid	Erosion and flood control	625	1900	Mixed pine and oak forest
Cárcavo	Murcia, SE Spain	Semiarid	Erosion and flood control	1990	1950	<i>Pinus halepensis</i> forest
Ricote	Murcia, SE Spain	Semiarid	Erosion and flood control	890	1905	<i>Pinus halepensis</i> forest
Montes de Málaga	Malaga, S Spain	Sub-humid	Erosion and flood control	4760	1930	<i>Pinus halepensis</i> forest
Bottida	Sardinia, Italy	Humid	Erosion and flood control, wood production	60	1965	Mixed coniferous and oak forest
Bono	Sardinia, Italy	Sub-humid	Erosion and flood control, wood production	20	1965	Mixed coniferous and oak forest
Monti	Sardinia, Italy	Humid	Erosion and flood control, cork production	309	1957	<i>Quercus suber</i> and <i>Pinus pinea</i> forest
Pattada	Sardinia, Italy	Humid	Erosion and flood control	90	1951	Mixed oak and pine forest
Tempio	Sardinia, Italy	Humid	Erosion and flood control, production	320	1930	Mixed pine and deciduous forest
Terras da Ordem	Algarve, S Portugal	Semiarid	Erosion and flood control	550	1969	<i>Pinus pinea</i> forest
Vila Real de S. António	Algarve, S Portugal	Semiarid	Dune stabilisation	288	1923	<i>Pinus pinaster</i> forest
Barão de São João	Algarve, S Portugal	Sub-humid	Erosion and flood control	218	1936	<i>Pinus pinea</i> forest
Quinta da Nogueira	Castelo Branco, E-Central Portugal	Sub-humid	Wood production, erosion and flood control	95	1987	<i>Pinus pinea</i> and <i>P. pinaster</i> forest
Penha Garcia	Castelo Branco, E-Central Portugal	Sub-humid	Wood production, erosion and flood control	225	1988	<i>Pinus pinea</i> and <i>P. pinaster</i> forest
Couto de Baixo	Castelo Branco, E-Central Portugal	Sub-humid	Wood production, erosion and flood control	222	1988	<i>Q. suber</i> and <i>P. pinaster</i> forest

Serra do Gajope	Trás-os-Montes, NE Portugal	Sub-humid	Wood production, erosion and flood control	1520	1975	<i>P. pinaster</i> and <i>Pseudotsuga menziesii</i> forest
Serra da Abelha	Trás-os-Montes, NE Portugal	Sub-humid	Wood production, erosion and flood control	71	1979	<i>Pinus pinaster</i> and <i>Pseudotsuga menziesii</i> forest
Dadia forest	Evros-Thrace NE Greece	Sub-humid	Wood production, erosion and flood control	663	1968	Mixed pine and oak forest
Sand dunes Vartholomio	Peloponnisos, S Greece	Sub-humid	Dune stabilisation	1308	1952	Mixed pine forest
Kedrinos	Thessaloniki, N Grece	Sub-humid	Erosion and flood control, landscape improvement	2976	1934	<i>Pinus brutia</i> forest
Stratoniki	Halkidiki, NE Greece	Sub-humid	Wood production, erosion and flood control	3476	1966	Mixed coniferous forest
Tarxiarchis	Halkidiki, N Greece	Sub-humid	Wood production, erosion and flood control	640	1963	Mixed pine and broadleaf forest
Saignon	Alpes-de-Haute-Provence, SE France	Sub-humid	Erosion control	380	1860	Mixed pine and deciduous forest
Brusquet	Alpes-de-Haute-Provence, SE France	Sub-humid	Erosion control	108	1870	<i>Pinus nigra</i> and <i>P. sylvestris</i> forest
Esterel	Provence-Alpes-Cote d'Azur SE France	Sub-humid	Post-fire forest recovery, cork production	6000	1950	<i>Q. suber</i> and <i>P. pinaster</i> forest
Palayson	Provence-Alpes-Cote d'Azur SE France	Sub-humid	Fire Protection, cork production	1136	1970	<i>Quercus suber</i> forest
Montmeyan	Provence-Alpes-Cote d'Azur SE France	Sub-humid	Increase diversity	750	1989	<i>Quercus pubescens</i> forest
Montagne Ste Victoire	Provence-Alpes-Cote d'Azur SE France	Sub-humid	Post-fire recovery	70	1989	Mixed pine and deciduous forest
Mont Ventoux	Alpes-de-Haute-Provence, SE France	Humid	Erosion control, mountain land restoration	2650	1900	Mixed coniferous and deciduous forest
Aigoual	Languedoc-Rousillon, SE France	Sub-humid	Erosion and flood control	9635	1859	<i>Fagus sylvatica</i> and <i>Abies spp.</i> forest
La Fage	Languedoc-Rousillon, SE France	Sub-humid	Erosion and flood control	570	1956	Mixed coniferous and deciduous forest
La Vis	Languedoc-Rousillon, SE France	Sub-humid	Erosion and flood control	1026	1886	Mixed oak and coniferous forest
Rialsesse	Languedoc-Rousillon, SE France	Sub-humid	Erosion and flood control	2103	1864	Mixed deciduous and coniferous forest

(\*) Date of first restoration actions

## ANNEX 2. REACTION Database: Query page and example of the Result page



**REACTION**  
Restoration Actions to Combat Desertification  
in the Northern Mediterranean

# Restoration Projects Data Base

[Map](#)  
[REACTION](#)  
[projects](#)

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### SEARCH REACTION PROJECTS

**General information:**

Country: <input type="text" value="All"/>	Project starting date: <input type="text" value="All"/>
	(year):
Bioclimate type: <input type="text" value="All"/>	Total size (ha): <input type="text" value="All"/>
Restored ecosystem: <input type="text" value="All"/>	Vegetation life zone: <input type="text" value="Any"/>

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**Scope of the project:**

<input type="checkbox"/> Restoration action/programme	<input type="checkbox"/> Pilot restoration for policy makers and managers
<input type="checkbox"/> Research	<input type="checkbox"/> Educational
	<input type="checkbox"/> Other

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**Functional goals and expected ecosystem services:**

<input type="checkbox"/> Productivity	<input type="checkbox"/> Agriculture production	<input type="checkbox"/> Forestry production
<input type="checkbox"/> Grazing/pasture lands	<input type="checkbox"/> Hunting	<input type="checkbox"/> Biodiversity conservation
<input type="checkbox"/> Riparian protection	<input type="checkbox"/> Wildlife habitat	<input type="checkbox"/> Erosion control
<input type="checkbox"/> Flood control	<input type="checkbox"/> Fire control	<input type="checkbox"/> Weed control
<input type="checkbox"/> Seed source	<input type="checkbox"/> Water infiltration	<input type="checkbox"/> Water filtration/quality
<input type="checkbox"/> Air quality	<input type="checkbox"/> CO2 sink	<input type="checkbox"/> Other

## RESULTS OF SEARCH REACTION PROJECTS

Results 1 - 5 of about 11. (Page: 1) [Next](#)

Title:	<i>Restoration proyect of Periago basin</i>	Country:	<i>Spain</i>	Project Code:	<i>PERIAGO</i>
Region:	<i>Murcia</i>	Date project starting:	<i>1952</i>	Total size:	<i>1650</i>
Bioclimate type:	<i>Semiarid Mesomediterranean</i>	Annual average rainfall:	<i>322.2</i>	General objectives:	<i>Flood and erosion control</i>
Structure Goals:	<i>Pinus halepensis forest</i>	Scope of the project:	<i>Restoration action/programme</i>	Functional goals:	<i>Erosion control, Flood control</i>
<a href="#">View details of the project</a> 					

Title:	<i>Forestation Pinaroto mountain</i>	Country:	<i>Spain</i>	Project Code:	<i>PINOROTO</i>
Region:	<i>Aragon</i>	Date project starting:	<i>1952</i>	Total size:	<i>295</i>
Bioclimate type:	<i>Semi-arid</i>	Annual average rainfall:	<i>463</i>	General objectives:	<i>Productive and forest surface increase</i>
Structure Goals:	<i>Pinus sylvestris forest</i>	Scope of the project:	<i>Restoration action/programme</i>	Functional goals:	<i>Forestry production, Erosion control</i>
<a href="#">View details of the project</a> 					

Title:	<i>REPOBLACIÓN PARCIAL DEL MONTE Nº 25, DENOMINADO "SIERRA DE RICOTE"</i>	Country:	<i>Spain</i>	Project Code:	<i>RICOTE</i>
Region:	<i>MURCIA</i>	Date project starting:	<i>1905</i>	Total size:	<i>890</i>
Bioclimate type:	<i>Semiarid</i>	Annual average rainfall:	<i>367</i>	General objectives:	<i>REPOBLACIÓN, CORRECCIÓN Y CONSERVACIÓN</i>
Structure Goals:	<i>Pinus halepensis forest</i>	Scope of the project:	<i>Restoration action/programme</i>	Functional goals:	<i>Productivity, Forestry production, Grazing/pasture lands, Hunting, Erosion control, Flood control</i>
<a href="#">View details of the project</a> 					

## **ANNEX 3.**

# **Peer Review of the REACTION Conceptual framework, criteria, and methodology for the evaluation of restoration projects**

### ***Reviewed documents:***

- 1- Bautista, S., Alloza, J.A., & Vallejo, V.R. 2004. Conceptual framework, criteria, and methodology for the evaluation of restoration projects. The REACTION approach. CEAM Foundation ([www.gva.es/ceam/reaction](http://www.gva.es/ceam/reaction)).
- 2- REACTION Questionnaire

### **Comments by J. Parrota**

In my opinion the authors of this report on the REACTION approach have provided an excellent overview of the concept of ecological restoration that focuses on ecosystem structure and function as a means of enhancing the environmental goods and services from degraded Mediterranean landscapes. In its discussion of restoration goals and evaluation and target ecosystems (reference systems), it recognizes the importance (and site-to-site) variability in social values that will be important factors in the determination of restoration goals, targets, and the criteria and indicators that will be used (which may change over time) to evaluate success of restoration actions. It also acknowledges that the "purist" restorationist target of ecosystems structure and function that may have existed prior to large-scale or intensive human alterations is neither practical nor desirable in this region (nor is it in most parts of the world), although ecosystems that have enjoyed some degree of conservation protection in recent centuries will have many uses for this program as reference sites.

The indicators, in general, cover a good range of ecological, socio-economic and cultural criteria (for restoration success) over an appropriate range of spatial scales, although the information that project managers will compile are designed primarily to evaluate restoration actions at the project site level.

The Questionnaire, which will be used to compile information on a wide range of quantitative, semi-quantitative and qualitative variables, is quite comprehensive in its present form. Are these data intended primarily for use by restoration project managers at the local level, or at national or regional levels? It would appear that these will be potentially most useful to the restoration managers and the local communities and other "stakeholders" that will be affected (hopefully positively) by restoration management of a given site. As such, it appears to be a very useful framework for objective evaluation of project success over time. A particular challenge may be to locate and compile, and in many cases collect, the data required to characterize baseline (pre-restoration) conditions, which will be critical for objective evaluation of trajectories of the many biophysical and socio-economic variables/indicators.

A few specific comments on the Questionnaire's Data Forms:

#### II 6. Degradation Impacts and Drivers.

Under "Impact Severity", the options "low", "medium" and "high" are not very meaningful (too subjective) - I would recommend that some more objective criteria be developed to characterize these three levels of impact severity, in terms of visible site characteristics that perhaps use vegetation structure, soil condition (erosion status) or other easily used criteria for evaluation of impact.

Under "Degradation Drivers", intensity classes are also too subjective and I suggest that criteria be developed to characterize these classes for each "driver". Also, you may consider adding additional drivers - specifically "uncontrolled wildfires (accidental or intentional)", and "hunting" (which may have important impacts on seed-dispersing wildlife or alter other ecological dynamics).

#### III 3. Cost, Financing and Participants.

Under question 3, shouldn't private land-owners be considered as those involved or potentially involved in projects?

#### IV 7. Field Treatment, Maintenance & Management

I would suggest adding a section within this that includes fire control and management activities. Presumably this will or should be part of many projects in the Mediterranean region?

#### VI 1. Project Assessment.

Under Question 2, a long list of vegetation types has been given. Have all these ecosystem types been defined and understood by all participants? As with many other classifications presented in the Questionnaire, it is important that participants have a common understanding of definitions and classification systems, particularly if the resulting information from these questionnaires is to be synthesized at the regional, national or international levels.

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**Reviewed documents:**

- 1- Bautista, S., Alloza, J.A., & Vallejo, V.R. 2004. Conceptual framework, criteria, and methodology for the evaluation of restoration projects. The REACTION approach. CEAM Foundation ([www.gva.es/ceam/reaction](http://www.gva.es/ceam/reaction)).
- 2- REACTION Questionnaire

**Comments by D. Lamb**

On the two documents: REACTION has done a lot of work on these and it will be very interesting to see the outcomes as REACTIONS activities develop. The background document (the Conceptual Framework) is excellent. Perhaps one topic that might have been explored a little more might have been the landscape issues? For example, where are the priority locations in a landscape where restoration should be addressed first? And how to make the trade-offs (within a landscape) between rehabilitation for enhanced production reasons and for biodiversity reasons?. This is not a major criticism but rather a topic that we might explore in future.

The questionnaire is very comprehensive and it will be very interesting to see the data assembled. Might its length and comprehensiveness put people off? What are expected use and end users of these data sets?

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**Reviewed document:**

REACTION Questionnaire

**Comments by D. Tongway**

Suggestions on Project evaluation. Most of the set of indicators will need to have protocols carefully written as what is current here are judgements made by some as yet unspecified interpretational criteria. This is a really critical area: there have to be well thought out criteria for these assessments to be made, otherwise there will be fanciful conclusions, based on gut feeling rather than good analysis of good data. Most of the questions in Section VI are what I call "high-level integration" questions -- lots of things are in the mix, but the means of appropriate data processing have to be clearly stated. It would be useful to construct a data-gathering and analysis system that groups very slow-moving data, slow-moving and fast moving data separately. Data reduction/ summarisation needs to be a prompt part of the system too.

Some specific comments:

Site Description. More subdivisions in topography and slope class would be useful. Aspect will also be important in Europe. Soil texture: I would want to know more about what the texture profile is: is there podsolization?

Erosion. How do you intend providing a protocol for people to assign a landscape to the right class? Will you provide photos?

Biodiversity. Who would know what to write in here? The absence of below ground fauna and flora is an omission.

Site preparation. I would be useful to know how and why there had been alteration in some detail, so that one could judge what needed then to be done (ranging from nothing to a lot).

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