



MEDITERRANEAN RESTORATION INFORMATION  
SYSTEM:

**REACTION QUESTIONNAIRE.  
GUIDELINES and FAQs**

**S. Bautista. CEAM Foundation**

## **REACTION QUESTIONNAIRE. GUIDELINES and FAQs**

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### **Overall structure**

The REACTION Questionnaire includes 8 sections:

- I. GENERAL INFORMATION
- II. SITE DESCRIPTION
- III. RESTORATION PROCESS
- IV. TECHNICAL DESCRIPTION BY RESTORATION UNITS
- V. ASSESSMENT BY RESTORATION UNITS
- VI. PROJECT ASSESSMENT
- VII. SUMMARY
- VIII. EXPERT JUDGEMENT

- √ Sections I, II, III, and VI deal with information about the whole restoration project.
- √ Sections IV and V allow compiling detailed information for any different unit included within the project. Sections IV and V are to be filled out as many times as units in the project.
- √ Section VII summarises project assessment and evaluation. The answer of each question is to be derived from the information compiled in specific previous sections and items (that are indicated for each question).
- √ Section VIII, expert judgement, is to be filled out by any expert who knows the project and/or has the expertise to evaluate the assessments compiled in the questionnaire. A number of different experts may be able to judge the same project, including experts from REACTION partnership. So, Section VIII can be filled out as many times as necessary.

### **When/what can we consider project units?**

Projects implemented over large areas may include relevant spatial variation in order to cope with, for instance, variation in bedrock type, altitude, previous land use, and other environmental conditions within the project area. Thus, species used, technology, and field treatments may vary in space. In addition, project goals might include promoting mosaics or gradients of dominant species and/or intended land uses, and therefore the project might include different sub-projects or restoration units. Even in case of a project having a homogeneous design, if the restored area includes contrasting environmental conditions, we can expect strong spatial variation in the project results. Therefore, areas having contrasting environmental conditions are considered as different units in the REACTION Questionnaire.

On the other hand, it is common to implement a restoration project in several stages or periods. For example, for a restoration project aimed at restoring woodlands on certain mountain range, project implementation was developed in 3 different periods: 1950-52, 1960-64 and 1970-71, due to socio-economical reasons. As far as project goal, species

used, technology, etc. were broadly the same, all the restoration actions can be considered parts of the same project and the three period are to be considered as three units in the REACTION Questionnaire.

Different stands in terms of species selection, field treatments, and/or site preparation can be considered as different restoration units within the same project. If unit specificity is due to variation in environmental conditions, they should be contrasting enough. If unit specificity is due to differences in implementation period, period should be distinct enough (i.e. a discontinuity between them should be clear)

### **Who will provide the information required? What is expected to be the information source?**

It is assumed that no single information source and/or expert can provide all the information required. Even in the best cases, with a lot of available information coming from a specific research work or from the expert in charge of the project, complementary information from maps, aerial photo, reports, etc., and some field assessment (see below) have to be considered.

### **About the quality of the answers on dates and amounts**

If possible, provide exact and figures. If not, provide rough - but accurate - figures. Please, for each date, just indicate the year. In some cases, if there isn't any information about the exact date (year), you may use a range (1950-1952) or refer to the decade (50's). For the starting point of a given project (date of first restoration actions), just indicate the year.

### **About the name of the species**

Please, always use scientific names

## **SECTION I. GENERAL INFORMATION**

### **I.1. General description**

**1. Project title** should be the name that identifies the project in most of the documents available. Please use an acronym or a short name as project code. Please use this project code as "project name" to save the questionnaire electronic files.

**2. Location.** UTM co-ordinates: please refer to 1950 European datum (the common datum in most maps).

**3. Time frame** refers to direct restoration actions. Expected succesional or developmental changes and/or management of the restored area are not considered here. Please, for each date, just indicate the year.

### **I.2. Data sources**

**1. Project contact** is the person who has most of the knowledge/information about the restoration project; the person to whom we may ask for more information, if needed.

**2. Data form contact** is the person who fills out the questionnaire; the person to whom we may ask about the reasons or meanings of some entries in the questionnaire.

**3, 5 & 6.** Cartographic data, articles, reports, other information. It is important to provide copies of the documents, maps, and photos available, which will be attached to the respective project file. Attached annexes will be electronic files, so please provide digitalised copies if possible. In case you provide hard copies, they will be digitalised.

**4. Any preliminary assessment?** Some entries in the questionnaire ask about the conditions before project implementation. This point aims at clearly describing the source(s) for this information.

**SECTION II. SITE DESCRIPTION**

This section aims at capturing minimum environmental characteristics defining the restoration project in order to facilitate cataloguing and evaluation.

It is expected that part of the information required can be directly obtained from existing restoration project descriptions and reports. If it is not possible, it should be obtained from topographic, geologic and land use maps, from reference weather-station records, and from any suitable source that provide information about the area affected by the restoration project.

**II.1. Climate**

**2, 3, 4, 5, 6, 7, 8 & 9:** It is expected that these data come from the suitable reference weather station. If you are using different reference weather station for rainfall and temperature data, please give location, distance from project area, and elevation for both of them. Example

a) Location: co-ordinates for rainfall ref. station: XXXX YYYY; for temperature ref. station: XXXX YYYY

**10. Bioclimatic classification.** If available in the project documents, please indicate bioclimatic classification as described in these documents (e.g. Type: semiarid. Classification: Emberger). If there is no description available, please apply Emberger classification using the climate data recorded in the questionnaire. Please just refer to the pluviothermic quotient (Q<sub>2</sub>):

$$Q_2 = 2000 P / (M + m + 546.24)(M-m),$$

Where P is the mean annual precipitation in mm, M is the mean of the maxima of the hottest month in oC and m is the mean of the minima of the coldest month in oC.

Per arid: Q <sub>2</sub> < 17	Semiarid: 30 < Q <sub>2</sub> < 57	Humid: 98 < Q <sub>2</sub> < 150
Arid: 17 < Q <sub>2</sub> < 30	Sub-humid: 57 < Q <sub>2</sub> < 98	Per humid: Q <sub>2</sub> > 150

**11 & 12. Microclimates and singularities.** These two points aim at pointing out any climate singularity that could not be captured by the previous climate description. Common differences between south- and north-facing slopes are not considered here as microclimates.

## II.2. Topography.

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**5 & 6. Reference catchment.** Please refer to the lowest-order catchment that includes the restored area

## II.3. Geology.

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Most of the questions of this and the above section (topography) are expected to be easily derived from digitalised maps and GIS. Please provide copies (hard copies or digitalised copies) of topographic and geologic maps including the perimeter of the restored area.

## II.5. Ecology.

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### 3. What can we consider here as reference area?

A reference area is any area showing the structure and function that is expected for the restored area in case of successful restoration. It is important to provide locations of these areas in order to facilitate further comparative field assessments, if necessary.

## II. 6. Degradation impacts and drivers

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It is assumed that part of the information required in this section need to be drawn on literature, historical records, and expert consultation (geographers, historians, etc.) and probably refers to a wider area than the restored area.

## SECTION III. RESTORATION PROCESS

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### III.1. Restoration goals

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**Goals and objectives** refer to the original goals, the objectives defined when the project was designed.

**Target biological community/ecosystem** to be restored is the ecosystem that the project intended to promote or improve. Examples: Mixed pine-oak forest, *Pinus halepensis* forest, *Pinus brutia* forest, ... (in case you give details on species, please use scientific names, as in the above examples)

Within **structural goals**, to introduce a species also means to re-introduce species that existed previously in the area but were absent or nearly absent at the time of project implementation.

**4, 5 & 6.** More than one option can be selected.

### III.2. Planning

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#### 1. Main stages provided for....passive restoration.

For example: 1: 10 years of avoidance of grazing (1950-1960); 2: prescribe burning (at the end of avoidance period); 3: low-intensity grazing (1960-present); 3: selective thinning of tree and shrub species (1960-present, every 10 years).

**2. Main stages provided for....active restoration.** For example, for site preparation, planting, construction of channel-flow control measures (dams, etc.), reinforcement planting, etc.

**3 & 4. Previous or parallel projects.** In some cases two or more projects can be tightly related (because they are part of a common programme, because they are developed in the same or neighbouring region/area, etc.) but they can not be considered as different units of the same project because the goals, approaches, source of financing, implementation framework, etc. are distinct. Please use these points 3 & 4 to indicate if there is any of these previous or parallel projects and if they are also described in a REACTION questionnaire.

### III.3. Cost and financing

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**1. Total cost of implementation.** In some cases it may be very difficult to know exactly the project cost. However, it is very important to provide at least a rough value of the cost.

The **reference date** will serve to calculate present-day cost

The question about “**Average annual cost of maintenance**” aims at better estimating the real cost of the project. Maintenance includes reinforcement planting, thinning, pruning, repairing structures, etc. performed in the framework of the project. Management works overall applied in the forest area of the region, restored or not, are not included. Please indicate the reference period used to calculate average annual cost. For example: Average annual cost for maintenance (Euros): 10000 (1960-1980). Ref.date: 1980

If it is not possible to know the cost of the project but there is information about average cost (per unit area) of that type of projects in that period, please indicate it in “other relevant information”

### III.4. General technical description

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**6. Success criteria.** For example, some projects may define as success criteria threshold values for first-year seedling mortality, or for plant cover or wood volume after a defined time period, etc.

### III.5. Monitoring and assessment

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If any kind of monitoring or assessment has been carried out, and the resulting outputs have been used to answer some parts of this questionnaire, please indicate in point I.2.6 (Data sources. Other information).

## IV. TECHNICAL DESCRIPTION BY RESTORATION UNITS

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### IV.1. Unit description

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If the project has not different units, please don't fill this entry and move to the next one IV.2

**2. Unit number/code.** For example: unit 1, unit 2, etc., or any other simple coding system.

3. In addition to the project general objective, the units may have specific objectives. For example, if the project used different species for each unit, specific (structural) objectives had to be different. In case of unit specificity due to intended land use, it is clear that specific objectives were different for each unit.

6. Please, just indicate the year(s)

**7. Any previous restoration actions applied to this unit?** If yes, it could be applied in the framework of a previous project or in the framework of the same project. In the second case, it should be recorded as a different unit

#### **IV.2. Specific environmental characteristics**

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Except points 14 and 15, requested characteristics are quite stable. Thus they can be obtained from a variety of sources, including actual field assessment.

**14 & 15.** Potential sources for data on soil erosion, plant cover, and land use before the project are: preliminary reports related to the project design, any existing study on the restored area before project implementation, aerial photography (please, indicate the sources used in point I.2.4.

#### **IV.3. Promotion of autogenic restoration**

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All the actions refer to already existing vegetation, not to planted or seeded vegetation. For management actions on planted or seeded plants go to section IV.7

#### **IV.4. Prior action on brush vegetation and IV.5 Site preparation**

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For dates, please indicate years

#### **IV.6. Planting and/or seeding**

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5. Rate 1 means the most important and rate 10 the less important criterium, respectively (Apply to the whole set of criteria, whatever the type)

#### **IV. 7. Field treatments/maintenance works/ management**

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**1. c) n° periods means** n° of vegetative periods (years) after the first planting or seeding. If the project includes more than one reinforcement planting/seeding, please use a different row for each action (please note that there is a mistake in the location of this entry. N° of periods refers to either planting or seeding).

**1. d) Mortality (%)** means the proportion of total seedlings that were replaced by the reinforcement planting

**1. e) Main agent or mortality** responsible for each reinforcement in the project. For example: transplant shock, summer drought, dry year (total annual rainfall clearly below average), predation by...(indicate predator species, if known), infection by... (indicate pest species, if known), low quality of site preparation, low quality of planted seedlings, etc. If there is no information about the main cause of mortality, please indicate "unknown".

**2 & 3. d) age of pruning or thinning.** Age (n° years) of individuals (broadly equivalent to n° years after planting or seeding). If these actions were repeated in time and/or on different species or with different intensities or methods, please indicate it. For example

a) species: *Pinus halepensis* and *Cistus albidus*

b) intensity: *P. halepensis*: 20% cover (age 3), 40 % individuals (age 15); *C. albidus*: 80 % cover (age 3)

c) method: clearing on strips

d) age of thinning: *P. halepensis*: 3 and 15; *C. albidus*: 3

**4, 5, 6 & 7. Was fertilizer used? Was the site irrigated? Were tree shelter used? Was weed control applied?**

**c) when?:** please indicate "at planting time" ("or at seeding time") if applicable. Otherwise indicate the year(s).

## V. ASSESSMENT BY RESTORATION UNITS

This is a key section in the QUESTIONNAIRE. In order to allow further evaluation of the project, most of the entries are compulsory. The information is expected to be gathered from existing and -if necessary for completing some gaps- from ad hoc assessments.

### V.1. Plantation/seeding results

**1. Reference (assessment) date.** It should be consistent with the information in point III.5 Monitoring and assessment

**4, 5 & 6.** Please indicate average values for the whole unit

### V.1. Structure & Biodiversity

**5. For tree species.** Please, indicate exotic when most of the trees in the restored site are exotic species.

**6. For other species** Please, indicate exotic when there are many exotic species in the site.

**8. resprouter species** include both obligate and facultative

**9. Biological inventories.** Any information about biological inventories, even partial, before the project is very valuable (often, the preliminary reports accompanying the restoration project design includes these inventories). If there isn't any species lists from the specific site but you know about dominant species and/or rare, endangered or threatened, please include just this information.

**10. Keystone or dominant species** that would be expected. For example, for some mature pine forests we could expect that some Mediterranean late successional shrub species dominate the understory

### V.1. Functions & Processes

**4. Erosion/accumulation type.** More than one type can be selected



**5. Erosion/accumulation intensity.** For sheet erosion, presence of pedestals usually indicates moderate or higher erosion intensity. For rill erosion, rill depth > 10 cm usually indicates severe erosion

7. If there is any relevant disturbance, describe the disturbance regime and the **regeneration patter**(s) in the following points: 8 & 9.

**9. Describe regeneration pattern.** In addition of any detail about the composition change and/or degradation process, if any, here we also ask about any relevant detail such as the rate of recovery (very slow, slow, fast..), the contribution of resprouter/seedler species, the contribution of the different functional groups or life forms, etc. For example: "During the first 2-3 years after the disturbance, plant regeneration was slow and mainly due to resprouter herbaceous species" or "the contribution to density and cover of the late-successional species X was greatly reduced after the disturbance and never recovered" or "severe erosion occurred during the first 3 years after disturbance", etc.

**10.** Again, any information about **productivity/carbon sequestration** is very valuable. If there is any partial information, even concerning just a small time period, please describe and give reference dates.

### V.1. Stand/Unit Health

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This entry refers to current (sensu lato) state. If we have any assessment of stand health from any time during the last decade, it can be considered as current-state assessment.

## VI. PROJECT ASSESSMENT

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### VI.1. Landscape & Environmental Assessment

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Points **2, 3, 4, 5 & 6** refer to the project area. Points **7 & 8** may refer to the project area but commonly they will refer to the reference catchment, if any, or to any reference area including the project area and affected -presumably- by the conditions of the project area.

### VI.2. Socio-Economic Assessment

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Unfortunately, information about most of the points included in this section is not easily available from common forest information sources. Here we should devote an additional effort to gather this information from any available socio-economic studies performed in the project or reference areas (please, give the suitable references in section I.2.3-6, and provide copies, if possible).

## VII. SUMMARY

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The answer of each question in this section should be derived from the sections and sub-sections indicated, so that the whole process is as much objective as possible.

**Examples:**

### VII.2. STRUCTURAL QUALITY

## **2. How natural/mature is the structure and pattern...(see V.2.1-4 and V.2.12)**

We should select "fully" if -according to the indicated sections and for a mixed pine-oak forest- the stand age (V.2.1) is "old", the tree canopy structure (V.2.2) is "multi-layered", the understory (V.2.3) is "varied and multi-layered" or " herbaceous layer and scattered woody plants", the spatial distribution of trees (V.2.4) is "patches and gaps" or "slightly clumped", and there are key species indicative of late successional stages (V.2.12).

## **VII.3. FUNCTIONAL QUALITY**

### **2. Overall functioning**

#### **How are the soil characteristics? (see V.3.3-5)**

We should select "stable" if % of bare soil (V.3.3) is low, if degree of soil crusting is "none" or "slight", if there is significant patchy or continuous biological crust (V.3.3), and if erosion/accumulation type is "none" or, in case there is any type of erosion, its intensity (V.3.5) is "nil" or "slight".

#### **How is the potential for nutrient cycling? (see V.3.1-3)**

We should select "high" if there are significant amounts of dead wood (V.3.1), particularly down logs, if average organic soil thickness is moderate to high, if % of bare soil (V.3.3) is low, if degree of soil crusting is "none" or "slight", and if there is significant patchy or continuous biological crust (V.3.3).

## **VIII. EXPERT JUDGEMENT**

This section gives room for subjectiveness. This part of the evaluation is based on the criteria of the expert signing each judgement. However, expert judgements should be built from the information captured in the questionnaire.