

FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

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**Referência do projecto**

Project reference

LTER/BIA-BEC/0048/2009 (Lacrado a 31-07-2009 às 11:13)

1. Identificação do projecto

1. Project description

**Área científica principal**

Main Area

Ciências Biológicas - Biodiversidade, Ecologia e Conservação

Área científica Secundária

Secondary area

Ciências Biológicas - Biodiversidade, Ecologia e Conservação

Título do projecto (em português)

Project title (in portuguese)

Investigação socio-ecológica de longo prazo numa paisagem cultural Mediterrânica (LTER Montado)

Título do projecto (em inglês)

Project title (in english)

Long-term socio-ecological research and monitoring in a Mediterranean cultural landscape (LTER Montado)

Financiamento solicitado

Requested funding

199.902,00€

Palavra-chave 1

alterações de uso do solo

Palavra-chave 2

alterações climáticas

Palavra-chave 3

serviços de ecossistema

Palavra-chave 4

cenários preditivos

Keyword 1

land use change

Keyword 2

climate change

Keyword 3

ecosystem services

Keyword 4

predictive scenarios

Data de início do projecto

Starting date

01-01-2010

Duração do projecto em meses

Duration in months

36

2. Instituições envolvidas

2. Institutions and their roles

-

Instituição Proponente

Principal Contractor

Fundação da Faculdade de Ciências (FFC/FC/UL)

Campo Grande - Edifício C7 -1º Piso

1749-016Lisboa

Instituição Participante

Participating Institution

Autoridade Florestal Nacional (AFN/MADRP)

Av. João Crisóstomo, 26-28

1069-040Lisboa

Fundação da Faculdade de Ciências e Tecnologia (FFCT/FCT/UNL)

Campus da Caparica

2829-516Caparica

Instituto Superior de Agronomia (ISA/UTL)

Tapada da Ajuda 1349-017

1349-017Lisboa

Instituto Superior Técnico (IST/UTL)

Av. Rovisco Pais

1049-001Lisboa

Universidade de Coimbra (UC)

Paço das Escolas

3004-531Coimbra

Unidade de Investigação

Research Unit

Centro de Biologia Ambiental (CBA/FC/UL)

Campo Grande, Edifício C5

1749-016Lisboa

Unidade de Investigação Adicional

Additional Research Unit

Centro de Estudos Florestais (CEF/ISA/UTL)

Tapada da Ajuda

1349-018Lisboa

Centro de Investigação em Ambiente e Sustentabilidade (CENSE)

FCT-UNL Campus de Caparica

2829-516Caparica

Centro de Recursos Naturais e Ambiente (CERENA/IST/UTL)

Av. Rovisco Pais

1049-001Lisboa

Instituição de Acolhimento

Host Institution

Faculdade de Ciências da Universidade de Lisboa (FC/UL)

Rua Ernesto de Vasconcelos - Edifício C5 - Campo Grande

1749-016Lisboa

3. Componente Científica

3. Scientific Component

-

3.1. Sumário

3.1 Summary

3.1.a Sumário Executivo (em português)

3.1.a Executive Summary (in Portuguese)

A investigação ecológica de longo-termo (LTER) é necessária, dado que muitos processos ecológicos exibem uma elevada

variabilidade interanual e uma susceptibilidade a eventos de perturbação raros ou episódicos, ambos impossíveis de detectar com observações de curto prazo. Isto é particularmente verdade em ecossistemas muito dinâmicos, em que a variabilidade é devida à imprevisibilidade do clima, à forte influência humana ou a uma combinação de ambas, como é o caso do montado [1]. Acresce ainda o facto da elevada variabilidade associada a flutuações dificultar a capacidade preditiva da alteração do ecossistema em diferentes cenários de alteração global.

A questão principal desta proposta prende-se com os objectivos clássicos do LTER e vai mais longe pretendendo compreender como é que o funcionamento do sistema montado, e a sua capacidade de fornecer serviços, responde a alterações de uso do solo num cenário de desertificação como previsto pelos modelos de alteração climática. O montado é reconhecido como um sistema agro-silvo-pastoril único e apenas presente na bacia do Mediterrâneo. Esta paisagem tipo savana é dominada por sobreiros e azinhais moldados através de milénios de práticas de gestão tradicional [2].

Devido à variabilidade encontrada no montado, resultante das interações clima-solo, espécies dominantes e usos do solo, foi seleccionado um macro-sítio (LTER Montado) com 3 estações principais de investigação e monitorização (I&M) que representam o gradiente de clima e tipos de solo. Estes conceptualizam uma plataforma socio-económica ao representarem diferentes regimes de uso do solo e cenários de desertificação, logo sujeitas a diferentes pressões.

Esta floresta multi-uso combina, no mesmo espaço, produção florestal, criação de gado, pastagens/cereais, com outros usos (eg caça). Recentemente nota-se uma maior sensibilidade para o seu papel como prestador de outros serviços, e.g. biodiversidade, mas estas funções ditas não-produtivas, não são igualmente percebidas e valorizadas pelos utilizadores, tendendo a entrarem em conflito com as produtivas [4].

Justifica-se assim esta proposta que, capitalizando na experiência interdisciplinar e investimentos em investigação de 7 instituições [eg 1,5 a 15], visa a I&M de longo termo no montado, sublinhado pelos princípios LTER que incluem a compreensão da estrutura e funções do sistema, e a sua resposta a pressões económicas, sociais e económicas. Acresce ainda o facto de, a nível Europeu, os ecossistemas sul-Mediterrânicos serem os menos representados na rede LTER e nenhum dos existentes representar o montado. Alterações ambientais (clima, uso ou degradação do solo, desertificação) e alterações sociais (abandono rural, turismo), a que se sobrepõem as tendências económicas (eg alterações na política da UE), ameaçam as práticas de gestão tradicional que promovem os benefícios associados ao montado e que são essenciais para a sua sustentabilidade [1]. Abordagens científicas dos membros do projecto têm gradualmente ajudado a aumentar o conhecimento acerca da composição, estrutura e funcionamento dos montados, focando temáticas tão variadas como o défice hídrico [9], trocas de carbono [10] variabilidade na precipitação [5], diversidade animal [12, 13], e outras [eg 1,6 to 8, 11,14,15]. Não é surpreendente no entanto que os resultados estejam dispersos no tempo e no espaço, não sigam indicadores e protocolos comuns, e raramente considerem os aspectos sociais.

O projecto está estruturado em 7 tarefas: #1 – Compilação de registos de observação de curto a longo-termo, #2 – Monitorização de promotores de mudança de larga-escala, #3 – Resposta do montado a pressões à escala local, Task #4 – Promotores sócio-económicos de mudança, #5 – Processos sociais participativos, #6 – Construção de um sistema de informação LTER, e #7 – Criação de sinergias em rede e da capacidade de investigação a longo-termo nos agro-sistemas do sul da Europa, no sentido de produzir uma estratégia genérica assente em recomendações e sugestões de investigação e monitorização futura que promova uma reconciliação efectiva das práticas agro-florestais e dos princípios de conservação.

Para além das capacidades científicas individuais das equipas de investigação que integram este consórcio, e os dados acumulados acerca do montado, a força desta proposta reside na logística e interesse demonstrado pelos sítios caso- estudo (que almejam uma sustentabilidade a longo termo) e outros actores-chave, tal como o maior produtor mundial de cortiça, as municipalidades locais, e os laboratórios de estado. Um outro ponto positivo é a estação de campo da Universidade de Lisboa, localizada no coração da distribuição do montado de sobro e que vai constituir a sede do sítio LTER Montado. Acresce ainda a existência de colaboração prévia entre os investigadores das várias equipas [10,14,15,30], juntamente com a capacidade de gerar proventos adicionais, a nível nacional e internacional, e que faz pressupor uma investigação de sucesso.

3.1.b Sumário Executivo (em inglês)

3.1.b Executive Summary (in English)

Long-Term Ecological Research (LTER) is required as many ecological processes exhibit high inter annual variability and susceptibility to rare/episodic disturbance events, both impossible to detect based on short-term observations. This is particularly true in highly dynamic ecosystems, where that variability is either due to climate unpredictability, heavy and changing human influences or a combination of both, such as in the montado landscapes [1]. Moreover, the high variation associated with natural fluctuations hinders the modelling of precise predictions of ecosystem change for different global change scenarios.

The main core research of our proposal encompasses the classical LTER objectives and goes further, aiming to understand how montado functioning and ability to provide ecosystem services, respond to land-use changes under a desertification scenario predicted by global climate change models. The montado (dehesa in Spain) is recognized as a unique agro-silvo-pastoral ecosystem found only in the Mediterranean basin. These savannah-like landscapes are dominated by cork and holm oaks, shaped over millennia of traditional land use practices [2].

Due to the variability found in montado landscapes, resulting from different climate-soil interactions, main tree species and land-use patterns, a macro-site (LTER Montado) with three core R&M stations were selected to cover the range of climate and soil types. These conceptualize a socio-economic platform by representing different land-use regimes and desertification scenarios, therefore involving different pressures.

These multi-use forests combine, in a single space, forest harvesting, livestock husbandry, pastures and/or crops, with other uses (eg hunting). Recently, increasing awareness arose on their benefits as other ecosystem services providers, eg biodiversity [3], but these non-productive functions are not equally perceived and valued by users, as they tend to be conflicting with productive ones [4].

This sets the frame of the proposal that, capitalising on the interdisciplinary expertise and research investments of 7 institutions [eg 1,5 to 15], envisages the long-term M&R of the montado ecosystem, underlined by LTER aims, which comprise ecosystem structure and functions, and response to environmental, social and economic drivers. Moreover, at the European level, South Mediterranean ecosystems are the weaker represented LTER sites and none of the existing represents the montado.

Environmental changes (climate, land-use or degradation, desertification) and social changes (rural abandonment, tourism), upon

which economical trends (eg EU policy changes) are superimposed, threaten the traditional management practices which provide the benefits associated with the montado [3,4,9,16,17], essential for its sustainability[1]. Scientific approaches by the team members have gradually helped to build up an increasing knowledge on the composition, structure and functioning of the montados, focusing on such diverse issues as water deficit [9], carbon exchange [10], precipitation variability [5], animal diversity [12, 13], and other [eg 1,6 to 8, 11,14,15]. It is no surprise however that the results are spread in time and space, do not follow common indicators and sampling protocols, and rarely consider social aspects.

The project is structured in 7 tasks: Task #1 – Compilation of montado-related short to long-term observation records, Task #2 – Large-scale monitoring of key drivers of change, Task #3 – Response of montado ecosystem to local-scale pressures, Task #4 – Socio-economic drivers of change, Task #5 – Participatory Social Processes, Task #6 – Building a LTER Montado Network Information System, and Task #7 – Networking and building long-term R&M capabilities in south-European agro-ecosystems) aimed to produce a generic framework with recommendations and guidelines for future research and monitoring that will promote an effective reconciliation of agro-forestry practices and conservation principles.

Besides the individual scientific capabilities of the research teams joined in consortium, and the accumulated data on the montado system, the strength of this proposal relies on the logistics and interest made available by the study case-sites (envisaging a long-term sustainability of their properties) and other stakeholders, such as the biggest world cork industry, local municipalities and forestry and development state departments. Another strength of the proposal is the field station of the University of Lisbon, located in the core area of the montado range, that will represent the LTER Montado site headquarters. Moreover, previous collaborations among the different research groups [10,14,15,30], together with their ability to generate research funds at the national and international levels, set the ground for a successful research.

3.2. Descrição Técnica

3.2 Technical Description

3.2.1. Revisão da Literatura

3.2.1. Literature Review

Long-Term Ecological Research is required as many ecological processes exhibit high inter annual variability and high susceptibility to rare/episodic disturbance events, both of which are impossible to detect based on short-term observations. This is particularly true in highly dynamic ecosystems, where inter annual variability is either due to climate unpredictability, heavy and changing human influences or a combination of both, such as in the montado landscapes [1]. Moreover, the high variation associated with natural fluctuations hinders the modelling of precise predictions of ecosystem change for different global change scenarios.

Ecological and social relevance of the montado

The montado (dehesa in Spain) is recognized as a unique agro-silvo-pastoral ecosystem found only in the Mediterranean basin. These savannah-like landscapes are dominated by evergreen cork and holm oaks and were shaped over millennia of traditional land use practices [2].

These multi-use forests are two-layered systems that combine, in a single space, forest harvesting, extensive livestock husbandry, pastures and/or cereal cultivation (the most evident economical revenues), with other traditional uses (hunting, beekeeping and mushroom picking). Recently, increasing awareness arose on their benefits as biodiversity reservoirs, recreation grounds, and other ecosystem services providers [3], but these non-productive functions are not equally perceived and valued by users, as they tend to be conflicting with productive ones [4].

This sets the frame of this proposal that, capitalising on the multi and interdisciplinary expertise and medium-term research investments of the institutions (and their team members) involved [eg 1,5 to 15], envisages the long-term monitoring and research of the montado ecosystem, underlined by LTER aims, which comprise ecosystem structure and functions, and respond to environmental, societal and economic drivers. Moreover, at the European level, South Mediterranean ecosystems are the weaker represented LTER sites and none of the existing represents the montado landscape.

Montado drivers of change

Environmental changes (climate, land-use or degradation, desertification) and social changes (rural abandonment, tourism), upon which economical trends (e.g. EU policy changes) are superimposed, threaten the traditional management practices which provide the benefits associated with the montado [3,4,9,16,17], essential for its sustainability[1].

Land-use policy changes that lead to land abandonment (predicted by most IPPC projections for S Europe) or conversely to intensification of mechanized agriculture, replacement of oaks by pine or eucalyptus or overgrazing by heavy livestock [4, 18], together with global climate change (6-8°C expected rise in maximum summer temperature and 50% reduction of rainfall [19]), are recognized as the main driving forces that will affect all levels of ecological organization and ultimately change the structure and functioning of this ecosystem [20 to 23], leading to desertification and land degradation especially in semi-arid areas [24]. Significant declines of adult trees is a new matter of concern [25], mainly because of its economic repercussions for Portugal (the main worldwide cork producer), but also due to conservation concerns about a generalised loss of biodiversity [eg 26] in a habitat listed in the Habitats Directive.

Why do we need a long-term assessment study in Montado?

A growing research effort has attempted to describe, understand and model the complexity of this semi-natural system. However, the slow and strongly seasonal dynamics of the biotic and abiotic components of the montado systems clashes with the contrasting short time framework available for most studies, representing an important impediment to sound research. As a consequence, approaches are generally limited to few years and to one, or only a few components – eg soil nutritional status, tree layer, species richness. Seldom two or more of these aspects are studied simultaneously [25], and relationships among them are usually inferred from studies made at different time and space-scales.

In spite of these shortcomings, recent scientific approaches, of which we advance those promoted by the team members, have

gradually helped to build up an increasing knowledge on the composition, structure and functioning of the montados, focusing on such diverse issues as water deficit [9], carbon exchange [10], precipitation variability [5], animal diversity [12, 13], and other [eg 1,6 to 8, 11,14,15]. It is no surprise however that the results are spread in time and space, do not follow common indicators and sampling protocols, and rarely consider social aspects. Some efforts have been made to gather and manage all that information but the outputs so far [eg 26], although important, are still modest.

Towards a sustainable management of the montado

Although the importance of the social and human dimension for management of natural resources has been often underlined [eg 27] it is generally absent in ecological studies. Members of the team already successfully integrated ecological data with social information [15, 28] and have developed environmental management systems (<http://cmrp.ist.utl.pt/GISA/>) that store, handle and make available a vast amount of information such as required under the LTER principle of information exchange. The assumption is that characterizing management practices and financial and socio-cultural local realities is the key to fully grasp the present status of the Human-Nature equilibrium in montado, and to produce management recommendations under a long-term perspective that envisions the future sustainability of these landscapes and of its goods and services.

3.2.2. Plano e Métodos

3.2.2. Plan and Methods

LTER sites and measured parameters must have the potential to answer several ecologically-related questions. The main core research of our proposal encompasses the classical LTER objectives and goes further, aiming to understand how montado functioning, and ability to provide ecosystem services, respond to land-use changes under a desertification scenario predicted by global climate change models. Due to the high variability found in montado landscapes, resulting from different climate-soil interactions, main tree species and land-use patterns, the landscape approach needed to fulfill the above stated objective requires the definition of a macro-site (LTER Montado) with three core research and monitoring stations spread over the montado landscape (LTER Montado map.pdf). These stations were selected in order to cover the range of climate and soil types found in the Alentejo province, the core montado area. Moreover, these sites conceptualize a socio-economic platform by representing different land-use regimes and desertification scenarios, therefore involving different pressures:

- Montado Alluvial Plains – alluvial sands, sub-humid climate, cork oak dominated
- Montado Coastal Mountains – schist soils, sub-humid climate, cork oak dominated
- Montado Inland Mountains – schist soils, dry sub-humid climate, holm oak dominated

To guarantee the representativeness of montado primary land uses (cork/wood production, livestock raising, game exploitation, etc), two contrasting study-cases were selected at each research station, informed by existing historic (since the XIXth century, in some cases) and recent datasets of ecological and socio-economic indicators of interest (see LTER Montado indicators.pdf). The study-cases refer to state or private properties that agreed to join the project and its goals, acknowledging the benefits to be gained in the long-term. For a short description on location, size, ownership, montado composition, past history of use, current use, main drivers of change and available datasets, see attached file (LTER Montado case studies description.pdf).

The project will be conducted by a multi and interdisciplinary consortium of 7 research institutions, plus the National Forestry Authority (AFN), and is structured in 7 tasks designed to: i) SYNTHETISE short to long-term information and knowledge (Task 1); ii) UNDERSTAND the functioning of the system and its response to current drivers and pressures (Tasks 2,3, & 5); iii) PROMOTE TRAINING of young scientists on long-term ecology (Tasks 2,3, 4 & 5); iv) CREATE A LEGACY of well-designed long-term data for future generations (Task 6); v) INFORM the scientific community of results by creating thorough databases (Tasks 6); vi) REACH OUT the broader scientific community, natural resource managers, policymakers, and the general public by providing decision support, information, recommendations, knowledge and capability to address complex environmental challenges (Tasks 6 & 7). Each task is relatively autonomous in the sense that it involves some innovative approach and produces sound and independent deliverables.

Task 1 aims at compiling available socio-ecological information, both at the macro (Alentejo province) and local (property) scales, and standardising the data to be integrated in databanks designed according to the specificities of LTER datasets. Due to the vast amount of indicators and data available and expected to be collected, this task will involve team members with expertise on meta-analysis and geo-statistics methods (mostly IGIDL, CERENA, CVRM [eg 5,6,7]), though a major input from those with expertise in montado biological systems (CBA, CEF - [1, 8 to 13]) and socio-economics (CENSE, IMAR [eg 29]) is also expected. Due to their state role, AFN, together with IGIDL, that will provide satellite imagery, will be the major data contributors at this stage. The design of harmonised protocols will also be defined in the course of this task, and the input of all team members is essential due to the different expertise and thematic approaches (ecology vs socio-economy).

Task 2 aims to monitor and increase current knowledge of large-scale key drivers of change (environmental pressures, such as droughts or economical drivers, such as land use policies) using a set of large-scale indicators at the macro-site level (IGIDL for climate and vegetation, CVRM for surface and groundwater and CENSE for regional economics). Data collection will be based in remote-sensing, field surveys and regional statistics.

Task 3 aims to assess responses of montado ecosystem to local scale drivers of change. Ecological indicators acknowledged both by the scientific community and by land owners/managers and decision makers will be prioritized. Selection of these will follow the results gathered in task 1. This is the main field of expertise of CBA, CEF, CERENA, CVRM and AFN teams, in close contact with the social and socio-economic teams (IMAR and CENSE). Data collection will be based in digital information and field surveys. Survey methods will be indicator-specific and research question-specific, and sampling will be conducted in the time periods that maximize data collection.

Tasks 4 and 5 are one of the major innovations of the project, as it will involve the assessment of how montado users value the ecosystem upon which they depend and rely for the prosecution of their lives and economic activities. This is a two-fold task since it will analyse regional economics and identify montado-related existing policies and policy instruments; these will then provide guidance for the preparation of participatory actions involving relevant stakeholders, since societal and individual valuations of ecosystem services are often conflictual. An assessment of the past uses of the montado at each focal study site will also be conducted and contrasted with the current situation. This task will be carried out by CENSE and IMAR teams; however, the

participatory process will rely on the input from the other team members.

The high demanding Task 6 aims at designing a LTER Montado Information System (NIS), as well as creating a web-site for the dissemination of the project, following the LTER principle of facilitating data exchange and synthesis. The design of the NIS will be conducted by the CERENA team with receives input from all other team members.

In task 7 contacts will be established with other research teams, particularly those conducting research in other agro-forestall LTER sites at the European scale, to promote networking and collaborative research in long-term ecologically-based research questions. It also corresponds to the final reporting phase, when main achievements will be synthesised and plans for the next triennium activities will be proposed.

Major contributions of the project to the state-of-the-art are expected to be: (1) the production of comprehensive datasets on the current structure and functioning of the montado agro-ecosystems in S Portugal and its large and local-scale key frivers of change; (2) a better understanding of the montado functioning; (3) a first integration of knowledge on the relations between ecosystem function and human values at a regional scale. This newly-produced knowledge will enable to evaluate the difficulties/ success of different management options (and approaches on how to propose them to the local communities), leading ultimately to deliver sound management recommendations with higher probability of successful implementation.

Besides the individual scientific capabilities of the research teams joined in consortium, and the accumulated data on the montado system, the strength of this proposal relies on the logistics and interest made available by the study case-sites (envisaging a long-term sustainability of their properties) and other stakeholders, such as the biggest world cork industry (AMORIM cork industry), local municipalities (eg Grândola, Benavente, etc) and forestry and development state departments (AFN and CCDR), as shown by their support letters. Another strength of the proposal is the field station of the University of Lisbon, located in the core area of the montado range (Herdade da Ribeira Abaixo, Serra de Grândola, Alentejo - <http://cba.fc.ul.pt/field-station.aspx>), that will represent the LTER Montado site headquarters. Moreover, previous collaborations among the different research groups in the frame of other projects (eg CBA/ISA [10], CVRM/CERENA [14], CBA/CENSE [15], CBA/CERENA [30]), together with their ability to generate research funds at the national and international levels (see Team projects.pdf), set the ground for a successful research.

Outputs of the project, besides the information management system and the webpage, includes a series of papers to be submitted to peer-reviewed journals of the socio-ecological spectrum, a few theses (master/PhD) and a closing workshop (with experts and lay people) on the current status and future of montado uses under CAP directives.

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3.2.3. Tarefas

3.2.3. Tasks

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Lista de tarefas (7)

Task list (7)

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Compilation of montado-related observ...	01-01-2010	31-12-2010	12	35

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

Montado landscapes are highly dynamic systems changing continuously in space and time as a consequence of human activities and seasonality. Climate changes and economic-driven habitat alterations have accelerated recently and the general consensus is that increasing rates of habitat degradation, loss and fragmentation, coupled with the effects of fire frequency intensification, are largely responsible for increasing the montado rate of change and decline.

The objective of this task is to compile short to long-term available datasets on multiple ecological and socio-economic parameters describing services provided by the montado ecosystem at two spatial resolutions: the macro-scale (Alentejo province) and the local-scale (study-case sites). These datasets will be standardised and assembled in specifically designed databases, comprising both historic and newly collected data.

Approach

The project will focus on the Alentejo province, a southern province dominated by evergreen oaks (cork and holm oak) that lies between the Atlantic coast in the west and the Spanish border in the east and represents both a natural (edapho-climatic conditions) and an anthropogenic (management practices and economic revenues) gradient, with implications in the patterns and processes of the biological systems. This selection results from the conjunction of three criteria. First this province represents the stronghold of the montado lands in the country, and of the cork oak forest in the world (>30% of total range); secondly all the partners have conducted research in the area [eg 1, and 5 to 15]; and thirdly, medium to long-term datasets are available, particularly those referring to climate and vegetation. Furthermore, as documented by research and monitoring studies previously conducted, biological communities are diverse [eg 12,13,30], giving grounds for a successful research.

The basis to characterize the evolution and current status of the montado landscape will be the forestry inventories [18], using a combination of landscape metrics and geo-statistics tools, and the climate dataseries available at each study-case site, as well as the modelled scenarios produced in the frame of previous projects [19]. The multidisciplinary nature of this task, and its importance to the following tasks, require the involvement of one or more members of each institution represented in the research team, using available expertise and technology.

Resources needed to accomplish this task refer mainly to human resources (Pos-Doc and BI Mestre), to compile, store and synthesize the data, and a desk computer to be fully devoted to this project.

Expected results

The resulting databanks, as well as the harmonised protocols to be developed in the frame of this task will constitute the groundwork of tasks 2 and 4, as well as the basis for the Montado network information system to be created in the frame of task 6. Furthermore

they will contribute to define testable hypotheses of ecologically-related research questions (Task 3) and to allow comprehensive syntheses needed to produce scenarios and propose broad-scale guidelines and recommendations to enhance sustainability of montado landscapes, a reasonable outcome of the project.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(BI) Bolseiro de Investigação (Mestre) 1; (BPD) Bolseiro de Pós-Doutoramento 1; Amilcar de Oliveira Soares; Ana Isabel Vasconcelos Dias Correia; Artur Raposo Moniz Serrano; Carla Sofia Dávila Soares Gonzalez; Carlos do Carmo de Portugal e Castro da Camara; Catarina Fernandes Moura; Célia Marina Pedroso Gouveia; Cristina Maria Branquinho Fernandes; Cristina Maria Filipe Maguas Silva Hanson; Filipe Miguel de Carvalho Costa e Silva; Francisco José Petrucci Guterres da Fonseca; Henrique Miguel Leite de Freitas Pereira; João Manuel Dias Santos Pereira; João Nuno da Palma Nascimento; Joaquín Hortal; Lúcio Pires do Rosário; Luís Filipe Tavares Ribeiro; Maria Adelaide dos Santos Clemente; Maria da Conceição Brálio de Brito Caldeira; Maria Filomena de Magalhães; Maria João Correia Colunas Pereira; Maria Margarida Mello Santos Reis G Fonseca; Maria Paula Baptista Costa Antunes; Maria Paula Sofio Silva Mendes; Maria Teresa Jorge Mendes Calado; Mir Zaman Hussain; Otilia da Conceição Alves Correia Vale de Gato; Paula Cristina Martins Fernandes Tavares; Pedro Rui Correia de Oliveira Beja; Ricardo Machado Trigo; Rita de Melo Durão; Rui Jorge Fernandes Ferreira dos Santos; Rui Miguel Borges Sampaio e Rebelo;

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Socio-economic drivers of change	01-01-2010	31-12-2012	36	11

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

The intrinsically linked social and ecological components in the montado challenges the in-depth understanding of this system and claims for trans-disciplinarity in order to adequately understand local socio-ecological specificities (Moller et al. 2004), eg values and uses of the montado, economic constraints on natural resources uses, information and access to policies. Moreover, to understand these socio-ecological systems in a long term perspective, the existing institutional setting (i.e., networks of Policy Institutions and Civil Society Organizations, current and in the pipeline policies, wrong signals and policy needs) should be considered due to its determinant influence in the way the local social and ecological components interact.

The main objectives of this task are: i) to characterize how do montado users value and use these ecosystems; and ii) to characterize the socio-economic context and institutional setting. The fundamental question is if montado users' values and uses are linked to both the environmental assessments conducted in the previous tasks and the socio-economic context and institutional setting.

Approach

This task is composed by two major components: i) transdisciplinary analysis of values and uses of montado; and ii) characterization of regional socio-economic context and montado-related existing institutional setting. This is the field of expertise of CENSE team and, in order to achieve this, a bibliographic review of previous studies and legislation will be done and combined with both open and semi-structured interviews in order to assess past and current values and uses of montado and identify stakeholders and key issues in the institutional setting.

Resources needed to accomplish this task refer to human resources (short-term contracts) to perform the bibliographic review, the compilation of the montado-related legislation and conduct the interviews. Funds are also needed to cover travelling inside the study area.

Expected results

This task will lead to a better understanding of how montado users value and use this ecosystem as well as establish heir relation with both the environmental assessments conducted in the previous tasks and the socio-economic context and institutional setting.

References

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Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(C) Contratado 2; Carla Sofia Dávila Soares Gonzalez; Maria Margarida Mello Santos Reis G Fonseca; Maria Paula Baptista Costa Antunes; Rui Jorge Fernandes Ferreira dos Santos;

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Participatory Social Processes	01-01-2010	31-12-2012	36	13

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

The participatory approach to research was drawn as a reaction to the failure of the formal social science methodology of the late 50s that produced considerable quantification and little stakeholder involvement of those undergoing 'development'. Therefore, the Participatory Learning and Action (PLA) is used as an added value to more formal methodologies (<http://www.iisd.org/casl/caslguide/Guide-Purpose.htm>). It integrates:

- Participant Observers that attempt an immersion in local life to understand and document how things work;
- Rapid Rural Appraisals (RRA) based in a variety of methods: (i) interview and question design techniques for individual, household and key informant interviews, (ii) methods of cross-checking information from different sources, (iii) sampling techniques adapted to a particular objective, (3) methods to obtain quantitative data in a short time frame, (iv) group interview techniques, including focus-group interviewing, (v) methods of direct observation at site level, and (vi) use of secondary data sources. RRA has been particularly useful in the approach to complex problems, especially those in which 'people factors' are prominent.

- Participatory Rural Appraisals (PRA) emerging in the 80's and distinguished by the use of local graphic representations created by the community that legitimize local knowledge and promote empowerment;
- Participatory Action Research (PAR) which emerged out of radical activist tradition in Latin America; it derives some of its rationale from awareness that PRA, for all its emphasis on participation, capability building, ownership of knowledge and empowerment, is still fundamentally an extractive and intellectual exercise.

Approach

This task, leaded by IMAR team, is organized in four major components: i) local perception analysis, including conflict assessment (e.g., uses, policies); ii) ecological knowledge assessment; iii) social learning processes; and iv) social profile trends and evolution. In order to understand the local' montado context perception, including existing conflicts (different uses) and ecological knowledge levels, the team will recur to qualitative semi-structured individual and collective interviews with key actors, to draw an initial local profile; interviews will be analysed and interpreted using content analysis to extract the most meaningful ecological related issues referred by the locals, namely diagnosing farmers' conditions, evaluating current and new technologies/practices, and assessing their impact (Bellon, 2001).

Conflicts will be systematized and grouped in "clouds", and key stakeholders involved identified. As for social learning processes, dialog forums including expanding publics are planned to be used, not only to understand the levels of existing ecological knowledge, but also to create secure spaces for debate and dialog constituting grounds for the development of social (in the forms of relationships and networks), intellectual (new knowledge) and political (empowerment and influence for change) capital. A social profile defined from existing regular statistic (e.g., population growth, demography dependency rates, % of unemployment) will characterized the quality of life, and allow for a long range comparison of trends.

To accomplish this task, services will be acquired to researchers experienced in participatory processes. Funds are also needed to cover travelling inside the study area.

Expected results

This task will lead to the acquisition of knowledge in: i) Local identity and cohesion levels; ii) Ecological knowledge level; iii) Conflict levels and issues; iv) Quality of life; and v) Social capital levels.

References

Bellon, M.R. (2001). Participatory Research Methods for Technology Evaluation: A Manual for Scientists Working with Farmers. Mexico, D.F.: CIMMYT.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

Carla Sofia Dávila Soares Gonzalez; Lia Maldonado Teles de Vasconcelos; Maria Margarida Mello Santos Reis G Fonseca;

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Monitoring of large-scale key drivers...	01-01-2011	31-12-2012	24	42

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

The Iberian Peninsula is recurrently affected by drought episodes and their adverse effects that range from severe water shortages to economic losses and related social impacts, reinforcing need for continuous monitoring. In the 2005 drought, Portugal spent more than 280M€ to compensate agricultural/hydrological damages. The IGIDL monitoring of 1999-2006 drought episodes showed that negative anomalies of NDVI were observed over large sectors of Southern Portugal for up to 9 months of the vegetative cycle [5]. A 21-year study from the team indicated a lagged inverse relation between NAO winter values and vegetation activity in the following spring/summer, giving useful information for crop forecasts and wildfire risk assessments [Gouveia et al. 2008]. Moreover, recent studies and projections of precipitation patterns (CERENA team) suggest a decrease in rainfall over the years and increase in the frequency of extreme precipitation events, key factors in desertification processes and soil degradation [6].

Besides precipitation, groundwater resources are also of major importance for the montado ecosystem dynamics [1]. CVRM team is experienced in groundwater resources and dependent ecosystems, using hydro-geochemical models to evaluate the impact of climate scenarios, soil uses and water consumption on the availability and quality of water resources. Interface areas between ground and surface waters have a particular role in the maintenance of human activities related to forest and agro-systems, which compete with many aquatic and terrestrial systems that are partially or totally dependent on groundwater. Monitoring tools have been previously tested by the research team [Nunes et al. 2004], who also carried out research on the effect of climate change in water resources (SIAM project).

Approach

This task refers to Alentejo as the factors under analysis act at the macro-scale.

Because of the vulnerability of montado to precipitation, IGIDL will assess the sensitivity of vegetation to variations in the precipitation regime, with special attention to trends and inter-annual variability, namely to the very sharp decrease of rainfall in March and the occurrence of extreme drought episodes. An assessment will be made about the impact of climate variability and change on vegetation stress in the risk of large wildfire events. The approach involve multivariate statistical analysis of time series of meteorological and biophysical parameters obtained from weather stations, atmospheric circulation models, climate scenarios and remote-sensed imagery.

The dependence level of ecosystems from groundwater resources shall be evaluated for several areas by CVRM, estimating the vulnerability of natural and semi-natural systems to water consumption rates according to each type of soil use. The methodologies are mainly groundwater and soil-water models, hydro-geochemical speciation models and solute transport models in non-saturate and saturate zones. Finally, the CERENA team will evaluate the spatial-temporal dynamics of extreme precipitation events. Resources requested are short-term contracts to compile and analyse existing and new data, as well as to missions for data validation.

Expected results

Changes in precipitation regime are expected to have a deep impact on the likelihood of extreme events (namely droughts) and therefore on vegetation stress and wildfire risk. Relations between precipitation patterns and piezometric trends are expected to give important information for modelling. It is also expected that drought periods affect the ecosystem not only by direct effects on water availability but also through indirect effects on water demand. This impact will tend to be particularly relevant in the case of water use for agriculture, as a result from changes of evapo-transpiration and soil moisture.

Gouveia C et al. 2008. Int J Clim 28: 1835-1847.

Nunes LM et al. 2004. Env Monit Ass 93(1-3): 103-124.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(BPD) Bolseiro de Pós-Doutoramento 1; (C) Contratado 1; Ana Isabel Vasconcelos Dias Correia; Artur Raposo Moniz Serrano; Carlos do Carmo de Portugal e Castro da Camara; Célia Marina Pedroso Gouveia; Cristina Maria Branquinho Fernandes; Cristina Maria Filipe Maguas Silva Hanson; Francisco José Petrucci Guterres da Fonseca; Henrique Miguel Leite de Freitas Pereira; João Nuno da Palma Nascimento; Joaquín Hortal; Luís Filipe Tavares Ribeiro; Maria Adelaide dos Santos Clemente; Maria Filomena de Magalhães; Maria Margarida Mello Santos Reis G Fonseca; Maria Paula Sofio Silva Mendes; Maria Teresa Jorge Mendes Calado; Otilia da Conceição Alves Correia Vale de Gato; Paula Cristina Martins Fernandes Tavares; Pedro Rui Correia de Oliveira Beja; Ricardo Machado Trigo; Rui Miguel Borges Sampaio e Rebelo;

Designação da tarefa

Task denomination

Response of montado ecosystem to loca...

Data de início

Start date

01-01-2011

Data de fim

End date

31-12-2012

Duração

Duration

24

Pessoas * mês

Person * months

51

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

Effects of large-scale changes must be monitored and related to local pressures, in order to fully grasp the causal mechanisms that alter the function of ecosystems and their ability to maintain the provision of ecosystem services. The synergistic analysis of mechanisms, from chemical and biochemical to physiological and ultimately ecological, is the most comprehensive way to understand the impact of long term changes, and therefore to be able to explain them to stakeholders or politicians.

Approach

Appropriate indicators (LTER Montado indicators.pdf) will be chosen amidst those currently assessed by the teams in different places and times and optimizing their sampling procedures. A majority of these is being monitored in other LTER sites and are being measured with well-established methodologies by the project teams in the proposed study-case sites; the selection of other indicators will follow from the results gathered in task #1.

Carbon and water fluxes and montado C sequestration will be monitored with the eddy covariance technique (sonic anemometer and gas analyzer) recording continuous net ecosystem gas exchange rates of CO₂ and H₂O installed in a 28m tall tower over the trees canopy. Tree transpiration (sap flow) will also be recorded.

Yearly measurements of stand structure and tree growth will be performed in all study case sites. Tree, shrub and grassland productivity and leaf area index will be assessed in permanent plots and transects already established.

Carbon and nitrogen isotope composition as well as C/N contents will be monitored in adult leaves with standard techniques of isotope ratio mass spectrometry and elemental analysis, at the lab dedicated to stable isotopes analysis and analytical methods at CBA. Both parameters will be useful to evaluate carbon and nitrogen metabolism and the impact of disturbance effects on plant-environment interactions.

Ecological indicators that can be understood and valued both by the scientific community and by land owners/managers and decision makers will be prioritized. A clear example is the extent and progression of the main oak diseases and oak decline, to be monitored in individual trees on permanent plots at all study case sites. Biodiversity will be monitored in all case study sites. Biodiversity assessments will involve an array of plant and animal species, with a particular emphasis on those groups that are perceived as valuable biodiversity indicators and on groups that are important as disturbance indicators or play a key role in the structure and function of the system. Surveys will be conducted in the time periods that maximize species presence detection in each taxa and follow appropriate survey techniques (e.g. quadrat-sampling for plants and insects, point-counts for birds, trapping for mammals). Raw data will be converted in biodiversity indexes; whenever possible, already proved ecological indexes will be calculated (eg, QBL for the integrity of riverine forests or the Common Bird Census Index). This is the main field of expertise of CBA, CEF, and AFN teams, in close contact with the social and socio-economic teams (IMAR, CENSE). Data collection will be based both in remote-sensing and field surveys; however, the majority of data will come from current work. Resources for this task are mostly to field missions, as other costs benefit from ongoing projects in the study case sites. Two weather stations will be acquired to compare Coitadinha and Mata de Sines local climate with that of the other study case sites.

Expected results

This task will lead to a selection of related biogeochemical indicators that will be the basis for the explanation of ecosystem responses and to harmonization and replication of different methodologies across study case sites. Results from this task, together with those obtained in task 2 will become the baseline data that will allow fulfilment of LTER objectives and upon which the remaining tasks will depend.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(BPD) Bolseiro de Pós-Doutoramento 1; Ana Isabel Vasconcelos Dias Correia; Artur Raposo Moniz Serrano; Catarina Fernandes Moura; Cristina Maria Branquinho Fernandes; Cristina Maria Filipe Maguas Silva Hanson; Filipe Miguel de Carvalho Costa e Silva; Francisco José Petrucci Guterres da Fonseca; Henrique Miguel Leite de Freitas Pereira; João Manuel Dias Santos Pereira; Joaquín Hortal; Maria Adelaide dos Santos Clemente; Maria da Conceição Brálio de Brito Caldeira; Maria Filomena de Magalhães; Maria

Margarida Mello Santos Reis G Fonseca; Mir Zaman Hussain; Otilia da Conceição Alves Correia Vale de Gato; Pedro Rui Correia de Oliveira Beja; Rui Miguel Borges Sampaio e Rebelo;

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Building a LTER Montado Network Infor...	01-01-2011	31-12-2012	24	41

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

Information Systems (NIS) are a fundamental tool in environmental and socio-ecological issues, since they expose and merge heterogeneous data into a standard format available for scientists and a broader community to perform synthetic analysis. The development of the NIS is a critical issue in LTER networking, responding to the data access policy required in LTER membership.

Approach

The objective of this task is twofold: i) the design, development and implementation of an integrated management system; ii) and the design, development and implementation of a website for dissemination of the project. CERENA team will lead this task, which will integrate all the results of previous tasks (1 to 5). The development of such a system will contribute for developing the following tasks. Task 5 will be sub-divided in two main actions:

Action 5.1 Integrated management system

A unique database will be the basic container for all information used and/or generated by the project. The database will be built on SQL and a software application will be developed for accessing the database remotely via internet; different access levels will be defined for users; the application will allow the introduction, edition, visualization and querying of data; tools for exporting data to common formats will also be developed.

Additionally, information will be organized on a GIS based on ArcGIS technology. This will provide the possibility of performing spatial analysis of data within site and intra sites. Data stored at the database can also be accessed via GIS.

Action 5.2 Website

The Website will be the most important tool for dissemination of the project. The contents of the webpage will be supplied by all teams involved. The website should have a simple design and provide an easy access to information about all initiatives of the project.

To accomplish this task, a full-time Master graduate grant-holder, assisted by the project's Pos-Doc, is required to handle the vast amount of information to be available; experience in modelling, geo-statistics and, if possible, web-designing will be required. Funds are also needed to cover travelling inside the study area for field validation.

Expected results

Besides the design of the Network Information System and that of the website, the establishment of strong synergies among team members and the training of young students are expected to be another outcome of this task.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(BI) Bolseiro de Investigação (Mestre) 1; (BPD) Bolseiro de Pós-Doutoramento 1; (C) Contratado 1; (C) Contratado 2; Amílcar de Oliveira Soares; Ana Isabel Vasconcelos Dias Correia; Artur Raposo Moniz Serrano; Carla Sofia Dávila Soares Gonzalez; Carlos do Carmo de Portugal e Castro da Camara; Catarina Fernandes Moura; Célia Marina Pedroso Gouveia; Cristina Maria Branquinho Fernandes; Cristina Maria Filipe Maguas Silva Hanson; Filipe Miguel de Carvalho Costa e Silva; Francisco José Petrucci Guterres da Fonseca; Henrique Miguel Leite de Freitas Pereira; João Manuel Dias Santos Pereira; João Nuno da Palma Nascimento; Joaquín Hortal; Lúcio Pires do Rosário; Luís Filipe Tavares Ribeiro; Maria Adelaide dos Santos Clemente; Maria da Conceição Brálio de Brito Caldeira; Maria Filomena de Magalhães; Maria João Correia Colunas Pereira; Maria Margarida Mello Santos Reis G Fonseca; Maria Paula Baptista Costa Antunes; Maria Paula Sofio Silva Mendes; Maria Teresa Jorge Mendes Calado; Mir Zaman Hussain; Otilia da Conceição Alves Correia Vale de Gato; Paula Cristina Martins Fernandes Tavares; Pedro Rui Correia de Oliveira Beja; Ricardo Machado Trigo; Rita de Melo Durão; Rui Jorge Fernandes Ferreira dos Santos; Rui Miguel Borges Sampaio e Rebelo;

Designação da tarefa	Data de início	Data de fim	Duração	Pessoas * mês
Task denomination	Start date	End date	Duration	Person * months
Networking and building long-term R&M...	01-06-2011	31-05-2012	12	23

Descrição da tarefa e Resultados Esperados

Task description and Expected results

Rationale

Reconciliation is a key word in modern land management and conservation policies and a key step towards sustainability. But, in spite of its growing relevance and need for implementation, to our knowledge, attempts to effectively do so are scarce. Moreover, situations where the conflict has been partly addressed still lack broad scale approaches combined with local specificities to allow generalizations and the design of predictive scenarios and of a reconciliation framework of agro-forestry practices and conservation principles.

In an economically-driven world, the success of such a framework largely depends on the ability to integrate effective ecological and efficient socio-economic solution strategies. This task aims to have a strong contribution to such a framework and the team ability to communicate their results to science and society will be a strong indicator of its success.

Moreover, considering that drivers and pressures acting upon the montado ecosystem are similar to those faced in other rural landscapes of southern Mediterranean, it is also aimed to contribute to building up long-term research and monitoring capabilities in south-European agro-ecosystems.

Approach

As data at a broad-scale (Task 2) will be validated at a finer-scale (case-study sites - Tasks 3 to 5) ecological modelling tools to represent the complex interactions between physical, biological, and socioeconomic elements of montado landscapes can be used; these will be selected on the basis of the best fit to raw data, provided that underlying assumptions are met. Resulting models allow

an easier interpretation of the complexity of existing interactions and represent a powerful tool for filling gaps in existing data and to quantify the effects of management decisions on the condition of ecosystem services and assess the effects of individual drivers and scenarios on ecosystem condition and the supply of ecosystem services.

Emphasis will also be put on conditions that either minimize or escalate the conflict between conservationists and land owners/managers/users, and on whether strategies found feasible in the fine scale can be adapted to the broad scale. Also the inherent risks of different strategies will be outlined to avoid perverse consequences of the strategies. Recommendations will be made aiming at local effectiveness.

Moreover, emerging questions on the response to modern drivers and pressures will motivate contacts with scientists developing research in order agro-forestall systems around Europe, particularly with those in southern countries that face similar realities in terms of environment, economics and social dimension. Networking will promote synthesis and comparative research across sites and ecosystems and among other related national and international research programs.

To accomplish this task, it is crucial a strong cooperation among the research teams, assisted by the project's full time employees (Pos-Doc and BI). Funds are also needed to cover travelling in Alentejo and, eventually, in Europe.

Expected results

Writing of guidelines to help local communities, living with or depending on the montado, to take advantage of the available policy instruments generated at the regional, national, and European level, is an outcome of this task,; another is a workshop involving the project partners and targeting major stakeholders in the conflict to identify gaps in knowledge and future research needs. This is expected to result in the preparation of research proposals at the European scale, focusing particularly other LTER sites, which will further illustrate the ability of the research team to establish effective networking and collaborative research.

Dissemination in national and international terms, through the participation in scientific meetings, the submission of scientific papers to peer-reviewed journals, and via the mass media is expected to result not only from this task but at all project stages.

Membros da equipa de investigação nesta tarefa

Members of the research team in this task

(BPD) Bolseiro de Pós-Doutoramento 1; Amílcar de Oliveira Soares; Ana Isabel Vasconcelos Dias Correia; Artur Raposo Moniz Serrano; Carlos do Carmo de Portugal e Castro da Camara; Catarina Fernandes Moura; Célia Marina Pedroso Gouveia; Cristina Maria Branquinho Fernandes; Cristina Maria Filipe Maguas Silva Hanson; Filipe Miguel de Carvalho Costa e Silva; Francisco José Petrucci Guterres da Fonseca; Henrique Miguel Leite de Freitas Pereira; João Manuel Dias Santos Pereira; João Nuno da Palma Nascimento; Joaquín Hortal; Lia Maldonado Teles de Vasconcelos; Lúcio Pires do Rosário; Luís Filipe Tavares Ribeiro; Maria Adelaide dos Santos Clemente; Maria da Conceição Brálio de Brito Caldeira; Maria Filomena de Magalhães; Maria João Correia Colunas Pereira; Maria Margarida Mello Santos Reis G Fonseca; Maria Paula Sofio Silva Mendes; Maria Teresa Jorge Mendes Calado; Mir Zaman Hussain; Otilia da Conceição Alves Correia Vale de Gato; Paula Cristina Martins Fernandes Tavares; Pedro Rui Correia de Oliveira Beja; Ricardo Machado Trigo; Rita de Melo Durão; Rui Miguel Borges Sampaio e Rebelo;

3.2.4. Calendarização e Gestão do Projecto

3.2.4. Project Timeline and Management

3.2.4.a Descrição da Estrutura de Gestão

3.2.4.a Description of the Management Structure

The transdisciplinary character of this proposal requires a tight integration within and across thematic tasks, and this has been carefully considered in the project's organisation and management structure.

The overall coordination of the project will be undertaken by the Principal Investigator (Margarida Santos-Reis – MSR from CBA), who will also take the lead of tasks #1 (Compilation of montado-related short to long-term observation records) and #7 (Networking and building long-term research and monitoring capabilities in south-European agro-ecosystems) in close cooperation with other task coordinators; furthermore she will be responsible for promoting project's meetings, reporting and dissemination of results. The PI is experienced in coordinating national projects and as already been the responsible for a task in an EU project (see CV).

Research within the remaining tasks will be co-ordinated by partners with long-term research and coordination experience in the relevant fields (see project's timeline in attach and respective CVs). This is the case of Carlos da Câmara (CC - IGIDL), the leader of Task #2 (Large-scale monitoring of key drivers of change) with expertise in spatial analysis and modelling. João Santos Pereira (JSP - CEF) will coordinate task #3 (Local-scale research on the response of montado ecosystem to local pressures), as a consequence of its strong background in forestry and know how on montado ecosystem. Task #4 (Socio-economic drivers of change) and task #5 (Participatory Social Processes) will be respectively led by Rui Ferreira dos Santos (RFS - CENSE) and Lia Vasconcelos (LV - IMAR), both researchers with recognised expertise in socio-ecological issues, particularly those involving conflicting situations. Task #6 (Building a LTER Montado Network Information System) will be led by Maria João Pereira (MJP – CERENA), who has developed similar systems for other projects.

The PI and the tasks' leaders will form a Steering Committee to jointly guarantee a smooth organisation of individual tasks, as well as the monitoring of the whole project progress "to time and to cost". Decisions within the Steering Committee will be reached by consensus during technical meetings and an equivalent procedure applies within tasks and research area teams.

To guarantee an effective communication flow, we will set up a system for exchange of data, results, co-ordination decisions, and information material, and for reporting among partners; this will be done mainly using the email platform. Time schedules for fieldwork and for work within tasks will be regularly updated through regular partnership meetings planned to be held every three months; in these progress results and limitations will be also discussed. Additionally, technical meetings will be held as needed within the breakout groups involved in each task.

The present proposal does not conflict with basic ethical issues related to humans and animals.

3.2.4.b Lista de Milestones

3.2.4.b Milestone List

Data **Designação da milestone**
 Date Milestone denomination
 31-01-2010 KoM meeting

Descrição
 Description
 Kick-off-Meeting hosted by CBA for individual introduction of members of all research teams for and discussion of indicators selection criteria and data collection strategy. Moreover, a plan for communication flow among team members, administration, reporting and dissemination will be established.

Data **Designação da milestone**
 Date Milestone denomination
 20-12-2010 Meta-data compilation and sampling protocols harmonisation

Descrição
 Description
 Evaluation of the quality of the existing datasets and data base needs, in a meeting hosted by CERENA. Identification of knowledge gaps and protocol harmonisation for sampling of selected indicators at study-case sites will be discussed and achieved.

Data **Designação da milestone**
 Date Milestone denomination
 30-06-2011 Assessment of macro/local-scale socio-ecological indicators

Descrição
 Description
 First analysis considering both the ecological and the socio-economic components of the project and first modeling exercises. This again will involve all partners, who will now discuss criteria for reporting the project results.

Data **Designação da milestone**
 Date Milestone denomination
 20-12-2011 Team meeting for sharing information

Descrição
 Description
 Overview of LTER-montado first results. Meeting hosted by CBA; research groups will present their results, limitations and conclusions. A round-table discussion will follow, on data analysis and integration and further sampling needs. Plans for future funding and research projects will be discussed.

Data **Designação da milestone**
 Date Milestone denomination
 30-06-2012 Workshop Perspectives for LTER Montado research / monitoring

Descrição
 Description
 Aiming to share the motivation and results of the project, a workshop, open to ILTER community, will be held at a LTER-montado headquarters (HRA, Grândola). This will involve invited key-note speakers, several presentations illustrating all tasks of the project, and a round-table for discussion.

Data **Designação da milestone**
 Date Milestone denomination
 30-09-2012 Synthesis, final reporting and future prospects

Descrição
 Description
 Meeting of all partners to prepare the 1st phase (triennium) final report and discuss proposals for next triennium research and monitoring activities, this time framed in the European-scale collaborative research derived from the project itself.

3.2.4.c Cronograma

3.2.4.c Timeline

Ficheiro com a designação "timeline.pdf", no 9. Ficheiros Anexos, desta Visão Global (caso exista).

File with the name "timeline.pdf" at 9. Attachments (if exists).

3.3. Referências Bibliográficas

3.3. Bibliographic References

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Reference	Year	Publication
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3.4. Publicações Anteriores

3.4. Past Publications

Referência	Ano	Publicação
Reference	Year	Publication
[1]	2009	Aronson J, Pereira JS & Pausas JG. 2009. Cork oak woodlands on the edge. Ecology, adaptative management and restoration. Island Press, USA.
[5]	2008	Gouveia C, Trigo RM & DaCamara CC. 2009. Drought and vegetation stress monitoring in Portugal using satellite data. Natural Hazards and Earth System 9: 1-11.
[6]	2008	Costa AC, Durão R, Pereira MJ & Soares A. 2008. Using stochastic space-time models to map extreme precipitation in southern Portugal. Natural Hazards Earth Systems Science 8(4): 763-773.
[10]	2009	Unger S, Máguas C, Pereira JS, Aires LM, David TS & Werner C. 2009. Partitioning carbon fluxes in a Mediterranean oak forest to disentangle changes in ecosystem sink strength during drought. Agricultural and Forest Meteorology (Available on-line DOI 10.1016/j.agrformet.2008.11.013)
[13]	2009	Matos H., Santos M.J., Palomares F. & Santos-Reis M. (2009). Does riparian habitat condition influence mammalian carnivore abundance in Mediterranean ecosystems. Biodiversity and Conservation 23(3): 285-299.

4. Equipa de investigação

4. Research team



4.1 Lista de membros

4.1. Members list

Nome	Função	Grau académico	%tempo	CV nuclear
Name	Role	Academic degree	%time	Core CV
Maria Margarida Mello Santos Reis G F...	Inv. Responsável	AGREGAÇÃO	25	✓
Amilcar de Oliveira Soares	Investigador	AGREGAÇÃO	10	✗
Ana Isabel Vasconcelos Dias Correia	Investigador	DOUTORAMENTO	10	✗
Artur Raposo Moniz Serrano	Investigador	AGREGAÇÃO	10	✗
Carla Sofia Dávila Soares Gonzalez	Investigador	LICENCIATURA	10	✗
Carlos do Carmo de Portugal e Castro ...	Investigador	DOUTORAMENTO	10	✗
Catarina Fernandes Moura	Investigador	DOUTORAMENTO	10	✗
Célia Marina Pedroso Gouveia	Investigador	DOUTORAMENTO	5	✗
Cristina Maria Branquinho Fernandes	Investigador	DOUTORAMENTO	10	✗
Cristina Maria Filipe Maguas Silva Ha...	Investigador	DOUTORAMENTO	10	✗
Filipe Miguel de Carvalho Costa e Sil...	Investigador	DOUTORAMENTO	10	✗
Francisco José Petrucci Guterres da F...	Investigador	DOUTORAMENTO	10	✗
Henrique Miguel Leite de Freitas Pere...	Investigador	DOUTORAMENTO	5	✗
João Manuel Dias Santos Pereira	Investigador	AGREGAÇÃO	10	✓
João Nuno da Palma Nascimento	Investigador	MESTRADO	10	✗
Joaquín Hortal	Investigador	DOUTORAMENTO	10	✗
Lia Maldonado Teles de Vasconcelos	Investigador	DOUTORAMENTO	10	✗
Lúcio Pires do Rosário	Investigador	LICENCIATURA	5	✗
Luís Filipe Tavares Ribeiro	Investigador	AGREGAÇÃO	5	✗
Maria Adelaide dos Santos Clemente	Investigador	DOUTORAMENTO	10	✗
Maria da Conceição Brálio de Brito Ca...	Investigador	DOUTORAMENTO	10	✗
Maria Filomena de Magalhães	Investigador	DOUTORAMENTO	10	✗
Maria João Correia Colunas Pereira	Investigador	DOUTORAMENTO	10	✗
Maria Paula Baptista Costa Antunes	Investigador	AGREGAÇÃO	10	✗
Maria Paula Sofio Silva Mendes	Investigador	MESTRADO	10	✗
Maria Teresa Jorge Mendes Calado	Investigador	DOUTORAMENTO	5	✗
Mir Zaman Hussain	Investigador	DOUTORAMENTO	10	✗
Otilia da Conceição Alves Correia Val...	Investigador	AGREGAÇÃO	10	✗
Paula Cristina Martins Fernandes Tava...	Investigador	DOUTORAMENTO	20	✗
Pedro Rui Correia de Oliveira Beja	Investigador	DOUTORAMENTO	5	✗
Ricardo Machado Trigo	Investigador	DOUTORAMENTO	5	✗
Rita de Melo Durão	Investigador	MESTRADO	20	✗
Rui Jorge Fernandes Ferreira dos Sant...	Investigador	DOUTORAMENTO	10	✓
Rui Miguel Borges Sampaio e Rebelo	Investigador	DOUTORAMENTO	5	✗

(O curriculum vitae de cada membro da equipa está disponível clicando no nome correspondente)

(Curriculum vitae for each research team member is available by clicking on the corresponding name)

Total: 34

4.2. Lista de membros a contratar durante a execução do projecto

4.2. Members list to hire during project's execution

Membro da equipa	Função	Duração	%tempo
Team member	Role	Duration	%time
(BI) Bolseiro de Investigação (Mestre) 1	Bolseiro	36	100
(BPD) Bolseiro de Pós-Doutoramento 1	Bolseiro	36	100
(C) Contratado 1	Outro	6	100
(C) Contratado 2	Outro	6	100
Total: 4			

5. Projectos financiados

5. Funded projects

-

Lista de projectos financiados

Funded projects list

Referência	Título	Estado
Reference	Title	Status
POCI/BIA-BDE/61122/2004	Valor aditivo de fragmentos de...	Concluído
POCI/BIA-BDE/61491/2004	Filogeografia e evolução compa...	Concluído
<i>(Os detalhes de cada projectos estão disponíveis clicando na referência correspondente)</i>		
<i>(Details for each project are available by clicking on the corresponding reference)</i>		
Total: 2		

6. Indicadores previstos

6. Expected indicators

-

Indicadores de realização previstos para o projecto

Expected output indicators

Descrição	2009	2010	2011	2012	2013	Total
Description						
A - Publicações						
Publications						
Livros	0	0	0	1	0	1
Books						
Artigos em revistas internacionais	0	0	2	3	0	5
Papers in international journals						
Artigos em revistas nacionais	0	1	1	1	0	3
Papers in national journals						
B - Comunicações						
Communications						
Comunicações em encontros científicos internacionais	0	1	2	3	0	6
Communications in international meetings						
Comunicações em encontros científicos nacionais	0	1	1	1	0	3
Communications in national meetings						
C - Relatórios						
Reports	0	1	1	1	0	3
D - Organização de seminários e conferências						
Organization of seminars and conferences	0	0	0	1	0	1
E - Formação avançada						
Advanced training						
Teses de Doutoramento	0	0	0	2	0	2
PhD theses						
Teses de Mestrado	0	2	2	2	0	6
Master theses						
Outras	0	0	0	0	0	0
Others						
F - Modelos						
Models	0	0	0	2	0	2
G - Aplicações computacionais						
Software	0	0	0	0	0	0
H - Instalações piloto						
Pilot plants	0	0	0	1	0	1
I - Protótipos laboratoriais						

Prototypes	0	0	0	0	0	0
J - Patentes	0	0	0	0	0	0
Patents						
L - Outros						
Other						
Guidelines for Montado Reconciliation Ecology	0	0	0	1	0	1
	0	0	0	0	0	0
	0	0	0	0	0	0

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Acções de divulgação da actividade científica
Scientific activity spreading actions

Besides presentations in scientific meetings and papers submitted to peer-reviewed journals, the team aims to disseminate the project's results through the media and popular articles in environmental / agriculture / forestry related magazines. The project also seeks to promote information and awareness campaigns near montado stakeholders, illustrated by the results of this project. This will be achieved in the course of the Workshop scheduled for the project's last year (Milestone 5) and, particularly, through the webpage to be launched by then.

7. Orçamento

7. Budget

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Instituição Proponente

Principal Contractor

Fundação da Faculdade de Ciências

Descrição	2009	2010	2011	2012	2013	Total
Description						
Recursos Humanos	0,00	19.240,00	19.240,00	19.240,00	0,00	57.720,00
Human resources						
Missões	0,00	5.500,00	5.400,00	5.400,00	0,00	16.300,00
Missions						
Consultores	0,00	0,00	0,00	0,00	0,00	0,00
Consultants						
Aquisição de bens e serviços	0,00	0,00	0,00	0,00	0,00	0,00
Service procurement and acquisitions						
Adaptação de edifícios e instalações	0,00	0,00	0,00	0,00	0,00	0,00
Adaptation of buildings and facilities						
Gastos gerais	0,00	7.988,00	4.928,00	4.928,00	0,00	17.844,00
Overheads						
TOTAL DESPESAS CORRENTES	0,00	32.728,00	29.568,00	29.568,00	0,00	91.864,00
TOTAL CURRENT EXPENSES						
Equipamento	0,00	15.200,00	0,00	0,00	0,00	15.200,00
Equipment						
Total	0,00	47.928,00	29.568,00	29.568,00	0,00	107.064,00

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Instituições Participantes

Participating Institutions

Autoridade Florestal Nacional

Descrição	2009	2010	2011	2012	2013	Total
Description						
Recursos Humanos	0,00	0,00	0,00	0,00	0,00	0,00
Human resources						
Missões	0,00	0,00	0,00	0,00	0,00	0,00
Missions						
Consultores	0,00	0,00	0,00	0,00	0,00	0,00
Consultants						
Aquisição de bens e serviços	0,00	0,00	0,00	0,00	0,00	0,00
Service procurement and acquisitions						
Adaptação de edifícios e instalações	0,00	0,00	0,00	0,00	0,00	0,00
Adaptation of buildings and facilities						
Gastos gerais	0,00	0,00	0,00	0,00	0,00	0,00
Overheads						
TOTAL DESPESAS CORRENTES						

TOTAL CURRENT EXPENSES	0,00	0,00	0,00	0,00	0,00	0,00
Equipamento Equipment	0,00	0,00	0,00	0,00	0,00	0,00
Total	0,00	0,00	0,00	0,00	0,00	0,00

Fundação da Faculdade de Ciências e Tecnologia

Descrição Description	2009	2010	2011	2012	2013	Total
Recursos Humanos Human resources	0,00	2.000,00	2.000,00	2.000,00	0,00	6.000,00
Missões Missions	0,00	1.500,00	1.500,00	1.000,00	0,00	4.000,00
Consultores Consultants	0,00	0,00	0,00	0,00	0,00	0,00
Aquisição de bens e serviços Service procurement and acquisitions	0,00	0,00	0,00	0,00	0,00	0,00
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	0,00
Gastos gerais Overheads	0,00	700,00	700,00	600,00	0,00	2.000,00
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	0,00	4.200,00	4.200,00	3.600,00	0,00	12.000,00
Equipamento Equipment	0,00	0,00	0,00	0,00	0,00	0,00
Total	0,00	4.200,00	4.200,00	3.600,00	0,00	12.000,00

Instituto Superior de Agronomia

Descrição Description	2009	2010	2011	2012	2013	Total
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	0,00
Missões Missions	0,00	1.500,00	1.500,00	1.500,00	0,00	4.500,00
Consultores Consultants	0,00	0,00	0,00	0,00	0,00	0,00
Aquisição de bens e serviços Service procurement and acquisitions	0,00	2.850,00	2.850,00	1.800,00	0,00	7.500,00
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	0,00
Gastos gerais Overheads	0,00	870,00	870,00	660,00	0,00	2.400,00
TOTAL DESPESAS CORRENTES TOTAL CURRENT EXPENSES	0,00	5.220,00	5.220,00	3.960,00	0,00	14.400,00
Equipamento Equipment	0,00	0,00	0,00	0,00	0,00	0,00
Total	0,00	5.220,00	5.220,00	3.960,00	0,00	14.400,00

Instituto Superior Técnico

Descrição Description	2009	2010	2011	2012	2013	Total
Recursos Humanos Human resources	0,00	15.792,00	15.792,00	15.792,00	0,00	47.376,00
Missões Missions	0,00	1.000,00	1.000,00	1.000,00	0,00	3.000,00
Consultores Consultants	0,00	0,00	0,00	0,00	0,00	0,00
Aquisição de bens e serviços Service procurement and acquisitions	0,00	0,00	0,00	0,00	0,00	0,00
Adaptação de edifícios e instalações Adaptation of buildings and facilities	0,00	0,00	0,00	0,00	0,00	0,00
Gastos gerais	0,00	3.358,00	3.358,00	3.358,00	0,00	10.074,00

Overheads

TOTAL DESPESAS CORRENTES	0,00	20.150,00	20.150,00	20.150,00	0,00	60.450,00
TOTAL CURRENT EXPENSES						
Equipamento	0,00	0,00	0,00	0,00	0,00	0,00
Equipment						
Total	0,00	20.150,00	20.150,00	20.150,00	0,00	60.450,00

Universidade de Coimbra

Descrição	2009	2010	2011	2012	2013	Total
Description						
Recursos Humanos	0,00	0,00	0,00	0,00	0,00	0,00
Human resources						
Missões	0,00	330,00	330,00	330,00	0,00	990,00
Missions						
Consultores	0,00	0,00	0,00	0,00	0,00	0,00
Consultants						
Aquisição de bens e serviços	0,00	4.000,00	0,00	0,00	0,00	4.000,00
Service procurement and acquisitions						
Adaptação de edifícios e instalações	0,00	0,00	0,00	0,00	0,00	0,00
Adaptation of buildings and facilities						
Gastos gerais	0,00	866,00	66,00	66,00	0,00	998,00
Overheads						
TOTAL DESPESAS CORRENTES	0,00	5.196,00	396,00	396,00	0,00	5.988,00
TOTAL CURRENT EXPENSES						
Equipamento	0,00	0,00	0,00	0,00	0,00	0,00
Equipment						
Total	0,00	5.196,00	396,00	396,00	0,00	5.988,00

Orçamento Global

Global budget

Descrição	2009	2010	2011	2012	2013	Total
Description						
Recursos Humanos	0,00	37.032,00	37.032,00	37.032,00	0,00	111.096,00
Human resources						
Missões	0,00	9.830,00	9.730,00	9.230,00	0,00	28.790,00
Missions						
Consultores	0,00	0,00	0,00	0,00	0,00	0,00
Consultants						
Aquisição de bens e serviços	0,00	6.850,00	2.850,00	1.800,00	0,00	11.500,00
Service procurement and acquisitions						
Adaptação de edifícios e instalações	0,00	0,00	0,00	0,00	0,00	0,00
Adaptation of buildings and facilities						
Gastos gerais	0,00	13.782,00	9.922,00	9.612,00	0,00	33.316,00
Overheads						
TOTAL DESPESAS CORRENTES	0,00	67.494,00	59.534,00	57.674,00	0,00	184.702,00
TOTAL CURRENT EXPENSES						
Equipamento	0,00	15.200,00	0,00	0,00	0,00	15.200,00
Equipment						
Total	0,00	82.694,00	59.534,00	57.674,00	0,00	199.902,00

Plano de financiamento

Finance plan

Descrição	2009	2010	2011	2012	2013	Total
Description						
Financiamento solicitado à FCT	0,00	82.694,00	59.534,00	57.674,00	0,00	199.902,00
Requested funding						
Financiamento próprio	0,00	0,00	0,00	0,00	0,00	0,00
Own funding						
Outro financiamento público	0,00	0,00	0,00	0,00	0,00	0,00
Other public-sector funding						
Outro financiamento privado						

Other private funding	0,00	0,00	0,00	0,00	0,00	0,00
Total do Projecto	0,00	82.694,00	59.534,00	57.674,00	0,00	199.902,00
Total of the project						

8. Justificação do orçamento

8. Budget rationale



8.1. Justificação dos recursos humanos

8.1. Human resources rationale

Tipo		Nº de pessoas
Type		No. of persons
(BPD) Bolsa de Pós-Doutoramento		1
Duração (em meses)	Custo envolvido (€) (calculado)	Outros custos (€)
Duration (in months)	Total cost (€) (estimated)	Other costs (€)
36	53.820,00	3.900,00

Justificação do financiamento solicitado

Rationale for requested funding

The funding request by CBA for one BPD is justified by the heavy work in what concerns collecting, reviewing and standardize historical datasets, as well as intensive field work (ecological indicators data collection). Moreover, it is expected that this BPD will be also strongly contribute for the networking between partners.

Tipo		Nº de pessoas
Type		No. of persons
(BI) Bolsa de Investigação (Mestre)		1
Duração (em meses)	Custo envolvido (€) (calculado)	Outros custos (€)
Duration (in months)	Total cost (€) (estimated)	Other costs (€)
36	35.280,00	3.096,00

Justificação do financiamento solicitado

Rationale for requested funding

The funding request by CERENA for one BI is well justified by the enormous amount of work concerning the creation of a database with all available results. This main output of this project is of crucial importance to establish the grounds for an ecological database on montado, which will be available to all members, scientific community and general public. Accordingly it will be necessary to have a full-dedicated (100%).

Tipo		Nº de pessoas
Type		No. of persons
(C) Contrato		2
Duração (em meses)	Custo envolvido (€) (calculado)	Outros custos (€)
Duration (in months)	Total cost (€) (estimated)	Other costs (€)
6	15.000,00	0,00

Justificação do financiamento solicitado

Rationale for requested funding

Given the existence of a special requirement by CRVM and FCT-UL, of man-power for "short-term" actions (i.e. computing, interviews and assistance in participatory sessions), two different contracts are expected be carried out. These contracts will cover very short periods (weeks to a couple of months each year).

8.2. Justificação de missões

8.2. Missions rationale

Tipo	Nº de deslocações
Type	No. of participations
Trabalho de campo	20
Local	Custo envolvido (€)
Venue	Cost (€)
Alentejo e Europa	28.790,00

Justificação do financiamento solicitado

Rationale for requested funding

The requested funding is for supporting the expenses associated with multidisciplinary and field seasonal data collection, fuel, short-trips, car-renting and lodging. Travelling to Europe may be needed in the frame of the networking activities.

8.3. Justificação de consultores

8.3. Consultants rationale

(Vazio)

(Void)

8.4. Justificação de aquisição de bens e serviços

8.4. Service procurement and acquisitions

Tipo	Custo (€)
Type	Cost (€)
Support costs	11.500,00

Justificação do financiamento solicitado

Rationale for requested funding

ISA partner requires funding for flux tower maintenance and associated sensors and equipment and IMAR for assistance at participatory sessions with stakeholders and interviews.

8.6. Justificação do Equipamento

8.6. Equipment rationale

8.6.1. Equipamento já disponível para a execução do projecto

8.6.1 Available equipment

Tipo de equipamento	Fabricante	Modelo	Ano
Equipment type	Manufacturer	Model	Year
Lab facilities	Several	Several	1990

Tipo de equipamento	Fabricante	Modelo	Ano
Equipment type	Manufacturer	Model	Year
Field station	n.a.	n.a.	1996

Tipo de equipamento	Fabricante	Modelo	Ano
Equipment type	Manufacturer	Model	Year
Field equipment	Several	Several	1990

Tipo de equipamento	Fabricante	Modelo	Ano
Equipment type	Manufacturer	Model	Year
Computing facilities	Several	Several	2000

8.6.2. Discriminação do equipamento a adquirir

8.6.2. New equipment requested

Tipo de equipamento	Fabricante	Modelo	Custo (€)
Equipment type	Manufacturer	Model	Cost (€)
Climatic stations	Gestel	n.a.	10.000,00

Justificação do financiamento solicitado

Rationale for requested funding

The funding is designated to the acquisition of two climate stations (GESTEL), in order to guarantee local climatic measurements in all study-case sites. These will be set up at Mata de Sines and Herdade da Coitadinha, still not equipped with this type of instruments.

Tipo de equipamento	Fabricante	Modelo	Custo (€)
Equipment type	Manufacturer	Model	Cost (€)
Computing system	n.a	n.a.	5.200,00

Justificação do financiamento solicitado

Rationale for requested funding

A computer and a server, will be acquired by the coordinator team (CBA), in order to be fully dedicated to the project during its course and beyond it.

8.8. Justificação de adaptação de edifícios e instalações

8.8. Adaptation of buildings and facilities

(Vazio)
(Void)

9. Ficheiros Anexos

9. Attachments

Nome	Tamanho
Name	Size
LTER Montado indicators.pdf	13Kb
LTER Montado map.png	811Kb
LTER Montado_site description.pdf	113Kb
Team Projects.pdf	22Kb
Timeline LTER Montado.pdf	28Kb



31-07-2009 12:00:02



Financiado por fundos estruturais da UE e fundos nacionais do MCTES

