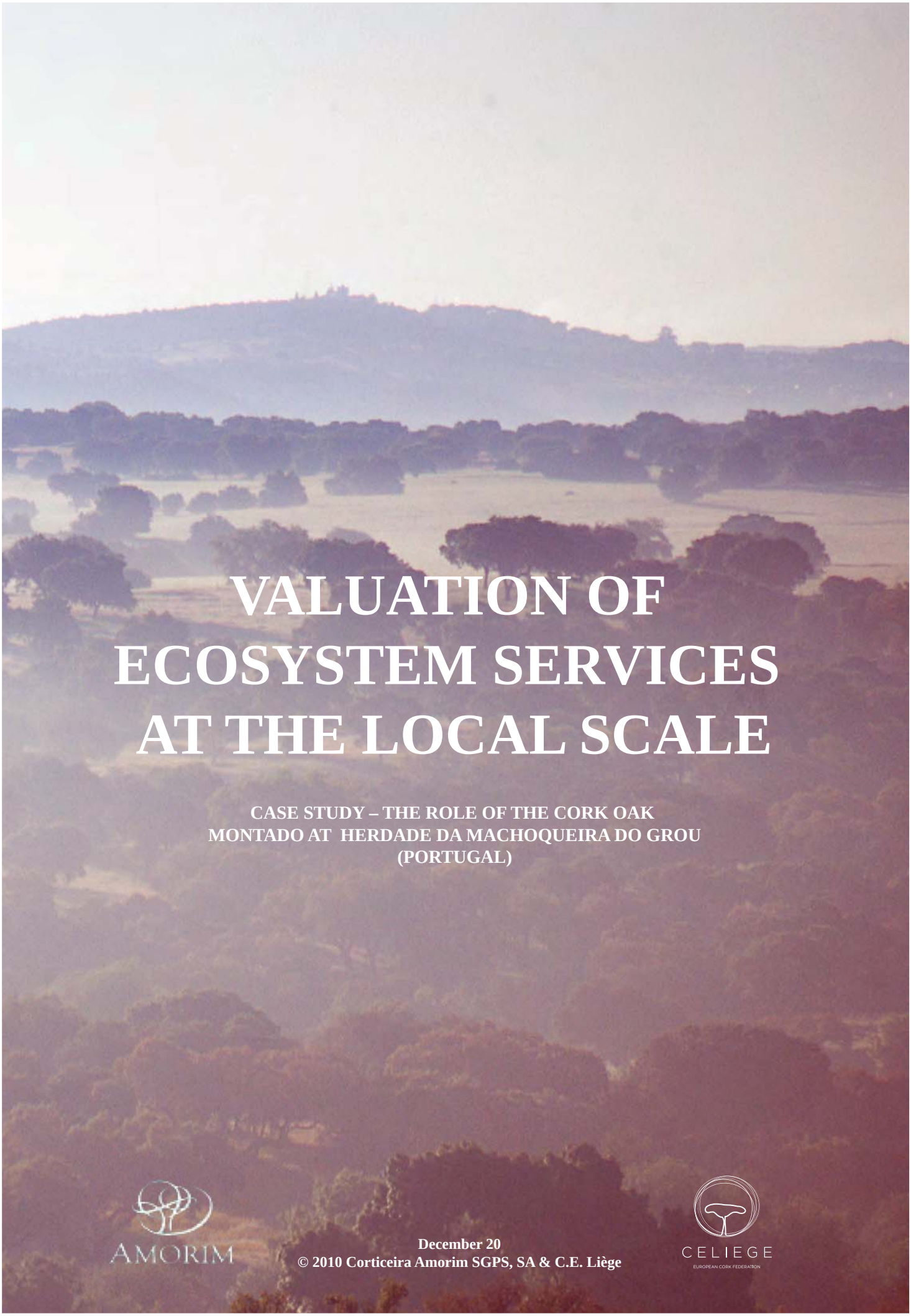

VALUATION OF ECOSYSTEM SERVICES AT THE LOCAL SCALE

CASE STUDY – THE ROLE OF THE CORK OAK MONTADO AT HERDADE DA MACHOQUEIRA DO GROU (PORTUGAL)

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Case Study – The Role of the Cork Oak Montado at Herdade da Machoqueira do Grou (Portugal)

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«We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers, people able to put together the right information at the right time, think critically about it, and make important choices wisely.»
Edward O. Wilson

1. CONTENTS

TABLES

FIGURES

1. ABSTRACT

By definition, 'Ecosystems' are ecological assemblages of habitats within a geomorphologic and climatic context, which leads mainly to a vision of Nature untamed, the wilderness. Yet, some ecosystems are dependent upon the interactions between the natural environment and human factors. Such is the case of managed forests, like the Cork Oak Montado. The economic valuation of Ecosystem Services (ES) puts the multiple benefits provided by ecosystems in evidence and provides the much needed economic context, vital for futher developments in conservation strategies. The assessment and valuation of ES in the private estate of "Herdade da Machoqueira do Grou" (HMdG) can facilitate voluntary improvements in the overall performance of the farm.

This report aims to highlight the issues beyond the ES valuation applyed to sustainable agroforestry management. This study has classified the services that ecosystems provide to people in three primary categories according to the Millennium Ecosystem Assessment (MEA): Provisioning, Regulation and Cultural Services. All the work is focused in bibliographic information and information provided by the landowners. Evaluation and valuation methods were used as tools to estimate the value of different categories of land use and associated Ecosystem Services, at a local scale. Actually, by the time this report was finished, it represented the first consolidated attempt to assess and valuate ES at such a small landscale, considering not just the local scale but most important, the land management unit scale, crucial to link future Payments for Ecosystem Services (PES) to agroforestry European Uniun subsidiary and financial support schemes.
The public and communitarian or shared services are explored in further detail, once they are the ones where payment schemes must focus on.

The main goals of the present report are:

1. To explore the link between ES and the spatial/temporal dynamics at the local level;
2. Understand the impacts and the possible changes on ES patterns promoted by the case-study land management throughout the years;
3. Assess, the most relevant ES; qualify identified ES as "Public or Communitarian/Shared Services";
4. Assess the relationship between agroforestry management and the conservation state/trend on selected ES, at the land use level.

The work was carried out in three phases:

1. Data Collection: all the information needs were defined and listed with corresponding sources to obtain them;
2. Data Treatment: the information was gathered, sorted, prioritized and then submitted to data interpretation methodologies;
3. Data Interpretation: Algorithm application and economic valuation.

The estate of HMdG is localized in Chamusca (Central Portugal), with 2.423 hectares is part of a left bank tributary of the Tejo River. The property, mainly a sandy, dry moor area was bought by the family in 1903. The HMdG was a poor area with its land cover mainly composed by barren heathland and Mediterranean scrublands.

The HMdG evolution history coupled with information from aerial photography (since the early 1940s) made possible the reconstruction of the baseline for the area, regarding Ecosystems Service state and trends. Today the area is dominated by Cork Oak (Quercus suber) Montado, eucalyptus plantations, maritime-pine plantations, stone-pine woodlands and water bodies.

The ES studied were under the cathegories of Provisioning, Regulating and Cultural Services. Provisioning accounted for a total of 12 ES, nine private, one communitarian/shared and one public;

2. INTRODUCTION

2.1. BIODIVERSITY AND ECOSYSTEM SERVICES – AN INTERDEPENDENT RELATIONSHIP

In any scientific essay there's something that's key to a good sound test: stability of terms. In this case, the term 'biodiversity' is considered rock solid, thus facilitating any temptative approach. That is to say, biodiversity is the variability among living organisms from all sources, including diversity within species, between species and of ecosystems (Heywood, 1995).

If biodiversity has an influence on ecosystem functioning in addition to any other roles it may play (e.g., Buchs, 2003; Costanza et al., 2007), then biodiversity maintenance directly benefits people by contributing to well-being or quality of life, as stated in the Millennium Ecosystem Assessment (MEA, 2005) that gives a wider understanding and use of ecosystem services and offered an heuristic classification system, raising questions about the costs of biodiversity loss to human society (e.g., CEC, 2004; Sukhdev, 2010).

The relationship between biodiversity and human well-being can be accounted through the concept of ecosystem services – ecosystem outputs that fundamentally depend on the properties of living systems (EEA Technical report n. º 3, 2010). Biodiversity plays a crutial role in providing ecosystem services and goods mainly trough the component populations, species, functional groups (guilds), food webs, habitat types or mosaics of habitats and land uses that collectively produce them, they are the ecosystem service providers (Zurlini et al., 2010).
Biodiversity is both a response variable affected by global change drivers and a factor modifying ecosystem processes and services and human well-being (MEA, 2005; Buckwell, 2009; Sukhdev, 2010).

Over the past century biodiversity loss has been so dramatic that it has been recognized as a global change in its own right (Walker and Steffen, 1996, GEO BON, 2009, 2010). This clear evidence of global decline in biodiversity, most state indicators show declines and pressure indicators show increases, and the rate of biodiversity loss does not appear to be slowing (MEA, 2005; Butchart, 2010). Biodiversity loss drivers include habitat loss and degradation, climate change, pollution, over-exploitation and the spread of invasive species (Baillie et al., 2004).

Most of the referred drivers are a direct consequence of human activities – affecting biodiversity and integrity of ecological systems (MEA, 2005; EEA Technical report n. º 3, 2010).
This has raised numerous concerns, including the possibility that the functioning of earth's ecosystems might be threatened by biodiversity loss (Schulze and Mooney 1993; Williams et al., 2004; Watson et al.).
The relationship between biodiversity and ecosystem functioning has a direct relevance to public policy, and has been the subject of considerable interest and controversy over the past decade (Cameron, 2002).
The structure of ecosystems and their associated ecological processes are responsible for all provisioning, regulation and cultural services, on which we depend.
Changes in productivity of ecosystems and in the nutrient cycle within them, disrupted balance between different species groups, undermining the capacity of these systems to deliver ecosystem services are a direct consequence of human activities (EEA Technical report n. º 3, 2010).
Biodiversity loss is reflected, not only, in the loss of species, but also in the loss of ecosystem functioning, thus affecting human well-being. Benefits for society derived from ecosystem services, depends on its quantity and quality.
Tracking changes in the quantity and quality of ecosystems and linking living organisms and the services they support will shed some light in the process of understanding the implications of biodiversity change on our own well-being (EEA Technical report n. º 3, 2010).
Costs concerning losses of species and/or services, although noticeable at the local/regional level, can go unnoticed at national and international level as true value of natural capital is an externality lacking consideration in decisions, indicators, accounting systems and market prices.

Regulating summed a total of 17 ES, six private, eight communitarian/shared and three public; and finally the Cultural Services had no private ES, with four public and one shared for a total of five. Land uses with a lower number of provided ES correspond to plantations (eucalyptus, maritime pine and the agricultural area) and to social areas.

On the other hand, mixed woodlands and the Montado provide the highest number of ES, the first providing two additional ES, although both private.
Three land uses provide the whole of public services, namely the Cork Oak Montado, mixed Cork Oak and stone pine woodlands and water bodies (including wetlands).
The pure Cork Oak Montado yield the highest total economic value. This case study pretends to be considered as a possible framework to assess and valuate Ecosystem Services in other agroforestry areas.

The concept of ecosystem services, the benefits we derive from nature, helps to make these benefits more clear. Taking them into account is the new approach we urgently need to manage natural values and resources, although the range of benefits derived from ecosystems is frequently poorly understood. Benefits can be direct or indirect, tangible or intangible and they can be provided locally and/or at broader scales. Also, they can be localized or scattered and are of crucial importance to future generations, making measurement particularly hard (Sukhdev, 2009).

2.2. Ecosystems Services: The Earth's Software

Ecosystem functions refer variously to the habitat, biological or system properties, or processes of ecosystems. Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions (Brauman et al., 2007; Zhang et al., 2007; de Groot et al., 2002; Turner et al., 2000; Costanza et al., 1997). But ecosystem services can be defined in multiple ways dependant on scale and perspective (Daily, 1997).

Life on earth, from microbes to humans, is supported by and dependent on biodiversity and ecosystems. The concept of 'Ecosystems Services' (ES) has become an important model for linking the functioning of ecosystems to human welfare (MEA, 2005; Buckwell, 2009; Sukhdev, 2010).
In a n imaginative way, we could consider that ES are in fact the Earth's Software that keeps Life on Earth running properly.

Efforts to understand theses links are essential for strengthening well-informed decisions on a wide range of decision-making contexts (Fisher et al., 2009). The causal links between environmental change and human health are complex because they are often indirect, displaced in space and time, and dependent on a number of modifying forces.

Efforts have been made from many areas of knowledge to understand the links between ecosystem processes and ecosystem services and their contribution as sources and generators of human welfare. The integration of perspectives from natural and social sciences contributes to improve both the valuation of these nature assets and their allocation in the social decision making processes (Figueroa & Pasten, 2009). Changes in indirect drivers, such as demography, technology and lifestyle, that affect biodiversity in a diffuse way, can lead to changes in direct drivers, such as land use change and fire regime, that affect biodiversity directly. These result in changes to biodiversity and to ecosystem services, thereby affecting human well-being.
These interactions can take place at more than one scale and can cross scales and across different time scales (see Figure 1).

Actions over indirect and direct drivers can be taken either to respond to negative changes or to enhance positive changes at almost all points in this framework. Local scales refer to communities or ecosystems and regional scales refer to nations or biomes, all of which are nested within global scale processes (MEA, 2005).

Within the large Earth's ecosystems goods and services which satisfy different necessities of people, from the most basic ones, such as food, water, clean air, shelter and relative climatic constancy are basic and unalterable, other services such as cultural and spiritual values and recreation may be less tangible than material services, but are nonetheless highly valued by people in all societies.

Additionally, ecosystems provide fundamental supporting life services (de Groot et al., 1992; de Groot et al., 2002) related with the regulation of atmospheric gases, climate, hydrological cycles, the mechanisms and processes determining the productivity and stability of soils, forests and wetlands (Figueroa & Pasten, 2009).

FIGURE 1
Multi-scale interactions

Relatively to food, reach great importance and value in poor countries, especially in rural areas where the health of human populations is highly dependent upon the services of local productive ecosystems for food (MEA, 2005, Sukhdev 2010). Rural areas also have the potential to provide other environmental and socio-economic services to society besides food.

In Europe, agricultural land constitutes the predominant type of rural land use and is increasingly seen as a multi-functional type of land use, delivering marketed goods (food, fibre and fuel) as well as non-marketed goods and services, such as recreation and amenity values, landscape maintenance, and habitats for farmland species (Porter et al., 2009).

The fresh water it's another important good from Earth´s ecosystems because over 1 billion people lack access to safe water supplies, while 2,6 billion people lack adequate sanitation which led to widespread of microbial contamination of drinking water.
The fuel and it´s generation causes a range of health impacts and all this referred goods, each of the ecosystem services referred to in the previous sections is sensitive to climate, and will therefore be affected by anthropogenic climate change (MEA, 2005).

Ecosystem services are absolutely vital to preventing disease and sustaining good health. Many important human diseases have originated in animals, and so changes in the habitats of animal populations that are disease vectors or reservoirs, may affect human health (Costanza et al., 2007), sometimes positively and sometimes negatively. About nutrient and waste management, processing and detoxification, humans are at risk from inorganic chemicals and from persistent organic pollutants in food and water (MEA, 2005).

However, the scarcity of goods is increasing at a fast rate due to ecosystem and biodiversity deterioration resulting from human activities which do not take into consideration the welfare costs of their environmental impacts (Figueroa & Pasten, 2009).

Many environmental, ecosystem and biodiversity assets are derived from common-pool resources, with public good and open access characteristics, and usually are not traded in formal markets, which causes their undervaluation by individuals and society. As a consequence individual and social decisions tend to disregard the broad range of services provided by ecosystems and lead to the degradation of natural capital and ecosystem services (Figueroa & Pasten, 2009). Ecosystem service valuation is being developed as a mechanism to integrate ecological understanding and economic

considerations and that can be used to respond to the insufficient inclusion of ecosystem services in policy decisions (Chee, 2004, Sukhdev, 2010).
Economicaly speaking, ecosystems are valuable because the goods and services they provide affect human welfare, and the decisions that individuals and society make in the scarcity context they translate their relative valuations of these goods and services (Costanza et al., 1997, Daily, 1997). Currently, are being developed different techniques to translate and measure the value of services that do not have explicit markets or explicit market prices.

These techniques, is possible to obtain quantitative estimation of the values attributed by individuals and the society to different goods and services. Results from these approaches provide extremely valuable information, not only on the relative appreciations by people of these ecosystem goods and services, but also on their relative scarcities and the relative willingness of people to care for the current and future supply and conservation of each one of them (Figueroa & Pasten, 2009).

The goods and services that ecosystems deliver to people and society can be classified in different categories, here we adopt the four primary categories defined in the MEA (MEA, 2005; de Groot, 2006; Figueroa & Pasten, 2009) (see Figure 2):

1. Provisioning (Goods and) Services: include tangible goods, such as food, water, fuels, fibers, and genetic resources, that are directly obtained from ecosystems; due to their direct use, most have a market value and are traded;
2. Regulating Services: include services, such as water purification, soil protection from erosion, regulation of disturbances (floods, drought, fire) and diseases, that are related to ecosystem functions and their contribution to regulate essential ecological processes and life support systems;
3. Cultural Services: include services, such as spiritual enrichment, cognitive development, religious values, recreation and aesthetic enjoyment, that humans obtain from ecosystems through knowledge and experience and sense of relationship with the natural environment e.g.. these services are closely linked to human values, identity and behavior;
4. Supporting (or based) Services: include services, such as primary productivity, nutrient cycling, carbon cycling, and soil formation, which are necessary for ecosystem functioning and for supporting the delivery of all other categories of ecosystem services. Their effect on human well-being is only perceived in the long term through the impacts on the provision of other ecosystems goods and services

The value of biodiversity and ecosystem services for human well-being is mostly perceived from an anthropogenic perspective. However biodiversity and ecosystems also have intrinsic value (see Figure 3). However, people usually make decisions concerning ecosystems only based on considerations of wellbeing as well as intrinsic value. The full assessment of the interactions between people and biodiversity requires an urgent multiscale approach, as this better reflects the multiscale nature of decision-making and provides a means of examining the differential impact of changes in biodiversity, ecosystem services, and policy responses on different regions and groups within regions (MEA, 2005).

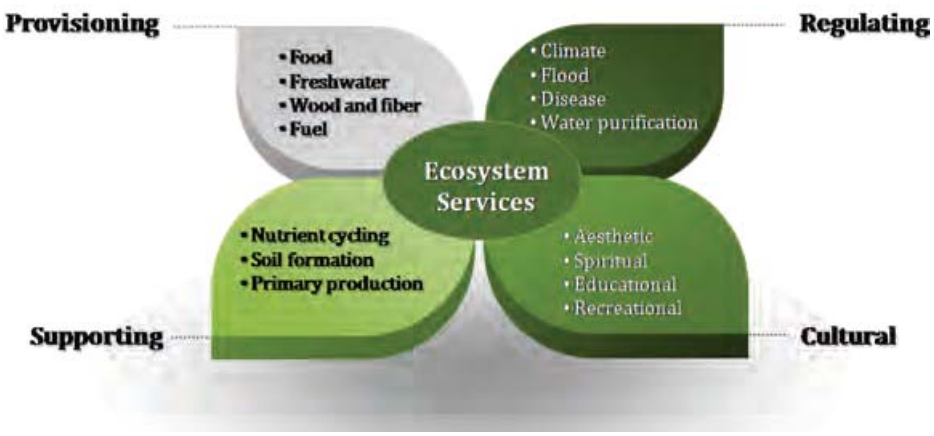
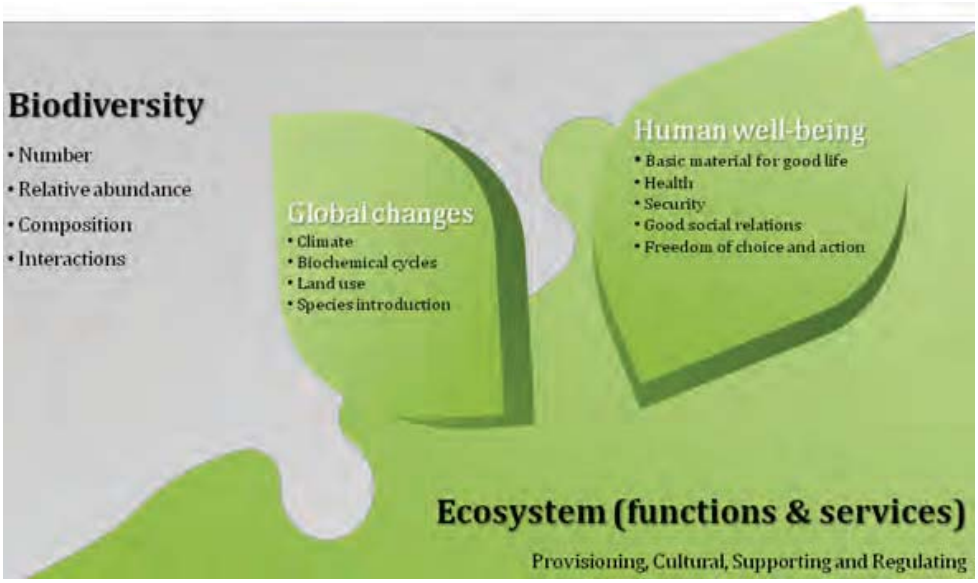


FIGURE 2
Conceptual model of connection types regarding ecosystem structure, processes, services and benefits.

FIGURE 3
Biodiversity, ecosystem functioning and ecosystem services.



2.3. VALUING ECOSYSTEM SERVICES

The valuation of ecosystem services has been receiving increasing attention from various society sectors as a way of providing more concrete data on the value and importance of biodiversity and ecosystems to people. The quantification of economic values can, and regularly does, provide useful information for public decisions, especially when the limitations as well as the strengths of the values are recognized.

There are various valuation methods adapted to estimate different types of value. These include the fact that ecosystems directly or indirectly support people's own consumption (use value) or that they support other people or species' own consumption (non-use value). Despite the existence of valuation methods adapted to different types of value, only provisioning services are routinely valued. The value of other services, such as supporting, cultural and regulating, is more difficult to assess because the benefit that people derive from these services (willingness of people to pay for these services - which are not privately owned or traded) – frequently cannot be directly observed or measured and usually it is not traded. In addition to the benefits that people obtain from ecosystems and the values associated with those benefits, biodiversity also has an intrinsic value, which is independent of any anthropogenic valuation besides the acknowledgment of its existence (MEA, 2005).

A possible response to the bias promoting provisioning services and causing the deterioration of other services are the Payments for Ecosystem Services (PES). The basic principle of Payments for Ecosystem Services-programs (PES-programs) is to reward landowners for the adoption of management practices that have beneficial environmental outcomes. This compensatory payment encourages the adoption of these practices that otherwise would be probably disregarded. A very good example of this scenario is the protection of endangered species and habitat in private lands. The PES-programs, if properly designed and successful, may help to make conservation of endangered species and their habitat attractive to private landowners, which would be in stark contrast to the set of negative incentives associated with many other policy instruments applied to this problem. For example, regulatory approaches to species conservation tend to inflict potential liability on landowners without providing them with potential gains. This approach creates a disincentive for landowners preventing them to promote endangered species, and may even encourage management choices to preemptively keep away endangered species occurrences and resist divulging information on their presence (Layton & Siikamäki, 2009).

There are two main approaches to ecosystem valuation. The first one refers to the use value of each system and the second refers to the outcome of such systems (goods, products and services)(e.g., Fisher et al., 2008; Ninan (Ed.), 2009;).

The Use Value approach estimates the Total Economical Value (TEV) of an environmental resource can be broken into two base components: Use Value (UV) and Non-Use Value (NUV).
The UV is the value that people assign to the actual use of the resources and of ecosystem services.

The UV can be divided into:

- Direct Use Value (DUV): This is the actual value given by an individual regarding the usage of that asset or service. In other words this refers to the usage of the resource in a productive activity (e.g., cork,wood), direct consumption (e.g., fooder, water for irrigation), or in recreational activities. Indirect Use Value (IUV): Represents the production or consumption value that resulted from the ecosystem's functions such as soil protection and carbon sink.

Option Value (OV): This value represents the society's wiliness to pay (WTP) to preserve a certain asset or ecosystem's service so that the society may use that same asset or service in the future even if they can't be used now (e.g. habitat conservation). This component can also be catalogues as NUV, depending on the literature.
The NUV is the usage that an individual gets from a resource but for other reasons that not it's actual and effective use. The NUV be divided into:

- Almost Option Value (AOV): The maximum value that and individual is willing to pay, today, to guarantee the preservation of a certain resource until a moment in time when he/she can make a more informed decision (about its preservation or not). Generally when a development decision has irreversible consequences (e.g. the decision to build a dam) the AOV is positive.
- Legacy Value (LV): This component quantified an individual's willingness to pay for the preservation of the environment so that in the future his or her descendants may use it.
- Existence Value (EV): Originally defined by Krutilla in 1967, the EV is the individual's value attributed to a resource even if he or she doesn't use it in the present and has no expectation of using it in the future. For example the preservation of biodiversity or protected ecosystems. The EV's value is based on a moral, cultural, ethical or altruism regarding the right to exist of non-human species or the preservation of other natural wealth's even if they don't represent a current use for the individual.

When considering the System's Outcome there is four principal categories of methods available for valuating ecosystem goods and services:

- Household revealed preference methods, including the travel cost, hedonic, and averting behavior methods
- Stated preference methods, including contingent valuation and attribute based methods
- Production function methods
- Replacement cost method.

Household revealed preference methods use the observed behavior of individuals as indicators of their WTP (Willingness-To-Pay) for an environmental attribute or condition. One way to measure the WTP is based on the traveling costs to the sites under valuation. The other option is to valuate based on the hedonic method, which estimates the property value considering the WTP for some attributes, such as scenic views, tranquility, uniqueness, etc. It can also be considered the averting behavior method where the ES are valuated by the contribute to provide better environmental conditions and, consequently, healthier conditions. Since each method focus on different attributes of the ES the method's choice will be different for each ES.

Stated preference methods don't have so many constraints as household revealed preference methods but are dependent on the ability of inquiries to understand the benefits of the ES and the capacity to predict realistic payment scenarios. The contingent valuation method is based on inquiries where people what is their WTP for a certain ES in specific scenario. On the other hand the attribute-based method gives several choosing options, usually containing two or three items each, and people is asked for each set to choose the item they prefer, where price is one of the attributes.
Production function methods are based on comparing similar set of operators where all inputs are constant except for the environmental inputs that are different and then compare their output and their net revenues.

Replacement cost or the alternative cost methods, unlike the other ones, is based on the cost of replacing a lost ES or conversely the replacement cost avoided if the ES is preserved (Brown et al., 2009).

2.4. Who Benefits From Ecosystem Services?

'Ecosystem Services' (ES) can be categorized in privately owned, which are mainly associated with provisioning services and tend to have a market value, and the ones that don't have a market value – the public and communintarian goods and services, like those in regulating and cultural services (Figueroa & Pasten 2009, EEA 2010, Farley & Costanza, 2010), as well as the ecosystem ability to maintain, replicate and evolve (EEA, 2010).

Regarding privately owned ES, like food and timber provisioning, the assessment of beneficiaries is straightforward, on the other hand regulating and cultural ES, which are public services, all society benefits from them, but without any direct investment being easely capturable. Public services provide benefits to one person without reducing the availability for others, also called non-rival, neither exclude others from using it, also called non-excludable. They can also be classified as functioning cooperatively and not competitively (Mankiw, 2006, Farley & Costanza, 2010).

Despite the importance of the services classified as public or shared between the community and the landowner, their management tends to be disregarded because they do not belong to private owners, who would be responsible for their management, and do not get the attention of investors because they lack a tangible market value. Other reason for this lack ov valuation it's related to the fact that the few existing assets are for common-pool resources (Figueroa & Pasten, 2009). The discrepancy between the scale where services are produced and the scale where they provide benefit contributes to increase the complexity of valuating ES, since some are produced at the local and benefit people at a larger scales (regional or global), who aren't aware about the provenience of those benefits and do not feel responsible for the managament of those ecosystems (Jose, 2009). That is to say, governments have to assume the maintenance costs of these ES, so it's all society that pays for them, while trying to compensate environmental market failures. The ways of payment can differ from country to country, but until now the perception of all these issues is too far away for citizens (Buckwell, 2009).

2.5. The Potential Of Rural Spaces And Cork Oak Montado

Rural spaces provide a wide range of Ecosystem Services to society. Agriculture and more generally agroforestry systems, being the most common types of rural land use in Europe, are increasingly seen as multifunctional, and both the Millennium Ecosystem Assessment (2005) and the International Assessment of Agricultural Science and Technology for Development (2008) have emphasized this role. Besides delivering goods for markets, such as food, wood, fibre and fuel, agroforestry systems also provide non-market services, such as recreation and amenity values, habitats for biodiversity, landscape maintenance and several regulation services (Porter et al., 2009; Jose, 2009, Buckwell 2009). Agroforestry systems, composed by trees, agricultural crops and/or animal production have the potential to enhance soil fertility, reduce soil erosion, improve water quality, enhance biodiversity, maintain and increase aesthetics and sequester carbon (Garrity, 2004; Nair et al., 2009, Buckwell 2009). Other rural spaces with non-agricultural land uses, for example wetlands and woodlands, also deliver multiple services including habitat provision, pollinators and recreation (Buckwell, 2009; Posthumus et al., 2010).

On the other hand, wrong or ill-suited agricultural and forestry practices can lead to soil erosion, water pollution, methane emissions and damage to wildlife (Pretty et al., 2001; Randall, 2007). For this reason, there is an increasing interest in motivating landowners, to adopt correct management practices that maintain environmental services of value to society (FAO State of Food and Agriculture Report 2007, Buckwell, 2009). This could be achieved through the provision of benefits and rewards, which can include financial benefits, or other benefits such as access to education.

An example of an agroforestry system, more specifically an agrosilvopastoral system, is the Montado, a unique system, occurring only in the Western Mediterranean. The Montado is the Portuguese term applied to landscapes comprising of mixed farming, centred on extensive evergreen oak woodlands dominated by Cork Oak (Quercus suber) or/and Holm Oak (Quercus ilex) and occasionally other oak species (*Q. faginea, Q. pyrenaica, Q. coccifera*),

and interspersed by areas of scrubland, grassland, wetlands and streamside galleries and cultivated fields. The Montado is the dominant system in the southern part of Portugal (especially in the Alentejo region, covering 72% of the total) existing for many centuries, in more or less developed and intensive management forms.
Montados provide a multifunctional land use, combining the use of the tree cover (mainly to extract cork or in the Holm Oak case to use the acorns for animal nourishing), with a a rotation of grazing, cultivation and fallow in the understory. The Montado is adapted to poor soils with reduced fertility and it represents a traditional, sustainable land use (Natividade, 1949, 1950, 1952, 1952b, 1955, 1964; Santos Pereira et al., 2008).

In Europe it can be found in Portugal, Spain, southern France and the west coast of Italy, covering 1, 43 million hectares, and in Africa, in Morocco, north of Algeria and Tunisia were it occupies 0,85 million hectares. More than half the area of the Montado is found in the Iberian Peninsula, 32% of the total occurring in Portugal, comprising 736,700 hectares (AFN, 2008; Aronson et al., 2009).

The Cork Oak Montado's prime product is cork, a renewable resource, whose exploration supports a considerable rich ecosystem and its maintenance possesses a recognized ecological, economical and social importance. This man-made / man-managed ecosystem contributes to biodiversity conservation, food production, water protection, acts as a carbon dioxide (CO2) long term sink, fiber production, soil restoration, natural hazards protection, and has a high potential for leisure, nature watching and outdoor activities (Aronson et al., 2009). With regard to natural hazards protection, the Cork Oak constitutes an excellent example of a species resistant to fire, a common disturbance in the Mediterranean basin. The cork on the tree, if not harvested, can growth to very thick layer and constitute a protective barrier against fire, being a high-quality and natural insulating material (Pausas, 1997). In addition, most Cork Oaks possess the capacity to resprout after severe disturbances, including fire (Aronson et al., 2009).

The cork industry also creates/maintains an important job volume, especially in the poorest areas, roughly 900 enterprises with 1500 job positions in Portugal, the leading country in cork exports (APCOR, 2009). Other important activity associated with this ecosystem is livestock production, with the understory (and the acorns) as pasture grounds. Cereals production, especially wheat, oat and barley is also an important sector for the Montado like hunting, with the system providing habitat for various game species (Pereira et al., 2009). Montados provide habitats for numerous species of fauna and flora, many of them threatened. This fact made it possible for this ecosystem to be recognized, at European level by the 'Habitats Directive' (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora), being classified with the codes 6310 (Montado) and 9330 (Oak woodlands). At the national level the Montado is protected by the Portuguese law (DL nº 169/2001), which prohibits or cautiously regulates the cutting of trees, reinforcing the importante to preserve and enhance this man-made ecosystem.

2.6. A Matter Of Scale: Local Accounts

Ecosystem Services occur at a range of spatial and temporal scales, from the short-term site level, such as amenity services, to the long-term global level, such as carbon sequestration (Turner et al., 2000; Limburg et al., 2002, MEA, 2005, Sukhdev 2010). Nitrogen fixation enhances soil fertility at the local scale, whereas carbon sequestration influences climate regulation at the global scale. The scale at which the ecosystem service is supplied determines which stakeholders may benefit from it, correlating spatio-temporal scales and stakeholders (Vermeulen & Koziell, 2002). Analyzing scales is important to show the interests of different stakeholders in ecosystem management. There is a need to examine the various scales at which ecosystem services are delivered and used, and how the supply of ecosystem services affects the interests of stakeholders at different scales (Hein et al., 2006). Households and enterprises operating local or internationally, may be directly depend in various ecosystem services for their income (e.g., farmers, ecotourism professionals). Nevertheless, all individuals are dependent of essential regulation services of ecosystems. Government agencies are involved in managing ecosystems, and in regulating ecosystem services access, sometimes applying

charges for the use of specific ecosystem services (e.g. natural park fees, hunting and fishing licenses) (Hein et al., 2006).

'Ecological scales vary from the level of the individual plant, via ecosystems and landscapes, to the global system, the ecosystem itself could be considered a particular scale, for example in terms of a forest ecosystem. Ecosystems functioning depends upon processes that take place over a range of spatial (and temporal) scales, from competition between plants at the plot level trough meso-scale processes such as fire and insect outbreaks, to the largest spatial and temporal scales having climatic and geomorphologic processes as examples (Holling et al., 2002). Generally, large-scale, long-period phenomena set physical constraints on the ones that occur at smaller scales and shorter periods (Limburg et al., 2002). On the other hand, large-scale processes could be driven by joint impact of small-scale processes (Levin, 1992).

Services and benefits such as soil fertility enhancement, reduced erosion, improved water quality, enhanced biodiversity, increased aesthetics, and carbon sequestration provided by agroforestry practices, occur over a range of spatial and temporal scales (Izac, 2003). These services and benefits constitute environmental externalities being derived at the farm scale or landscape scale although enjoyed by society at larger regional or global scales (Jose, 2009). Farm scale evaluation or local accounts, enables evaluation to link farm management and ecosystem services trends and quality, allowing to understand the role of the landowner in environmental externalities improvement or otherwise. Whether or not the landowner actions and practices enables others to benefit from these services, and what kind of scheme should be used to pay for the provision of these goods and services.

2.7. Eco-certification And Ecosystem Goods And Services

According to the Food and Agricultural Organization (FAO) Sustainable Forest Management is the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems (FAO, 1993).
Until now the claims made for well-managed ecosystem goods in the formal and voluntary "green" markets have largely been unsubstantiated in the absence of certification systems that assess their value. Nevertheless when a forest is well-managed, and in compliance with these standards it is expected to provide more than just goods, namely public and shared services.
The two major international Sustainable/Responsible Forest Management certification schemes are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC).

FSC promotes responsible management of the world's forests through a voluntary global certification scheme. While FSC has made great progress in terms of adoption and market recognition since its creation in 1993, it remains a system largely limited to certifying wood products entering into the international timber, biomass, pulp and paper markets. Although its Principles 5 – Benefits from the forest -, 6 – Environmental Impact – and 9 – High Conservation Value Forests – include Criteria that concern with multifunctional use of the forest, natural values (species and habitats) and cultural heritage (FSC, 1996), which are closely related to Ecosystem Services ES) and their value to the good function and management of the forest, nothing refers directly the importance to maintain or improve ES. On the other hand, FSC is now aiming to give more importance to ES as expressed by the new Principle & Criteria proposal (FSC, 2010), where ES are directly addressed. It has also started a project about ES to provide better tools to the standards development.

PEFC was founded in 1999 and also claims to promote good practice in the forest and to ensure that timber and non-timber forest products are sourced with respect for the highest ecological, social and ethical standards. Like with FSC the major focus is on wood products but the concern with sustaining the provision of ES is growing. Criterion 2 – Maintenance of forest ecosystem health and vitality – and Criterion 11 – Maintaining functioning forest ecosystems – assure that the National Standards has some indicators that comprise issues related with ecosystem services preservation.Long term investigation is still missing to address the relation between certification and the ability of an area to provide ES.

3. SCOPE OF WORK

All the work is focused in bibliographic information and information provided by the landowners. Evaluation and valuation methods were used as tools to estimate the value of different categories of land use and associated Ecosystem Services, at a local scale. Actually, by the time this report was finished, it represented the first consolidated attempt to assess and valuate ES at such a small landscale, considering not just the local scale but most important, the land management unit scale, crucial to link future Payments for Ecosystem Services (PES) to agroforestry European Uniun subsidiary and financial support schemes. The public and communitarian or shared services are explored in further detail, once they are the ones where payment schemes must focus on.

3.1. GOALS

ES assessment and valuation deals with a considerably large amount of data, most of which is not easely adquirable or has to be obtained by very qualified specialists, trough laborious time and budget consuming projects, which, although extremely necessary, are far from the scope of the present work. In addition the existence of different future scenarios, various interactions between variables and unpredictable market (for those with an existing, regulated market) and non-market values of the ES, highly contribute to the challenges of this project. Nevertheless, and keeping the constraints in mind, the main objectives were:

5. To explore the link between ES and the spatial/temporal dynamics at the local level;
6. Understand the impacts and the possible changes on ES patterns promoted by the case-study land management throughout the years;
7. Assess, the most relevant ES; qualify identified ES as “Public or Communitarian/Shared Services”;
8. Assess the relationship between agroforestry management and the conservation state/trend on selected ES, at the land use level.

The work was carried out in three phases:

4. Data Collection: all the information needs were defined and listed with corresponding sources to obtain them;
5. Data Treatment: the information was gathered, sorted, prioritized and then submitted to data interpretation methodologies;
6. Data Interpretation: Algorithm application and economic valuation.

3.2. THE CASE STUDY – HERDADE DA MACHOQUEIRA DO GROU

The ‘Herdade da Machoqueira do Grou’ (HMdG) is a family estate with 2.423 hectares in Chamusca, Ribatejo (Figure 4), and is part of a left bank tributary of the Tejo River; the entire watershed is on deep Miocene sands. The landscape is mostly plain, with slopes varying between 0% and 5%, and exceptionally up to 35%., U-shaped gullies, valleys, and occasional sandstone outcrops are frequent elements of the landscape and altitudes range from 79 to 173 m (HMdG GIS). The bioclimate is considered subhumid with 600 mm of mean average rainfall and 15. ºC of mean annual temperature..

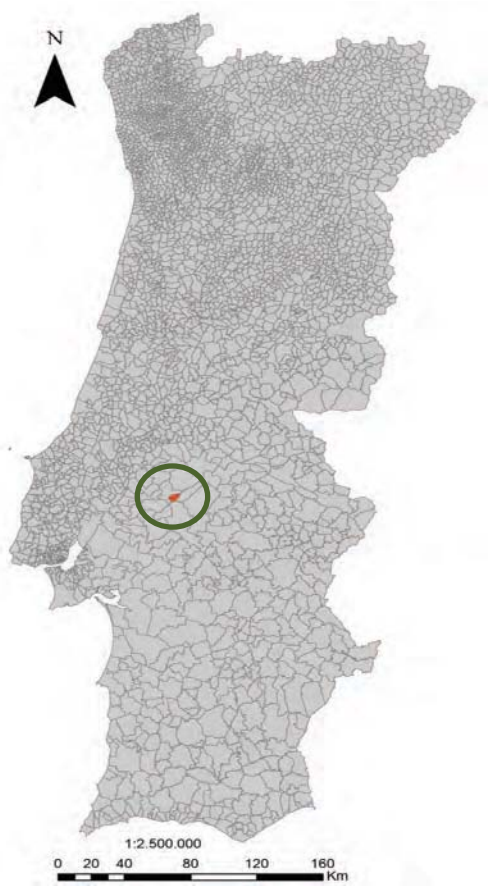
The property is mainly a sandy, dry moor area, with main soil types including fluvisols, leptosols, and podzols (HMdG Forest Management Plan, 2009)
The HMdG was bought by the current owner familiy in 1903. The present land uses and respective areas are presented in Figure 5 and Table 1. Aside from the cultivated valley floors (meadows and irrigated pastures), that act as fire barriers, the area is dominated by Cork Oak Montado. The Montado average density is 90 trees/ha, with an average crown projection area of 2600 m2/ha and an average tree height of 7,5 m. Main economic outputs from the Montado include cork and cattle (200 cows of an autochthonous breed, the ‘raça preta Alentejana’). Like recommended, cork is harvested every 9 years (average production of 1300 kg of dry weight per hectare) and the average cattle

stocking rate is 0,16 animal/ha (HMdG Forest Management Plan, 2009; landowners personal communication).

As disturbance regimes are concerned, no fires or severe flooding have been reported for a long time (last 100 years) yet, on the other hand, some tree decline is observed (about 20% of the area). Natural regeneration of trees is not uniform, they are lacking in some places due to livestock grazing and shrub clearing for fire prevention. In order to solve the problems arising from poor natural regeneration in some areas, the Forest Management Plan includes interventions and adjustments to promote it (e.g. fencing of young trees combined with shrub clearing with reduced soil disturbance) over the last 5 years and beyond. Most of the Montado and mixed woodland has been managed to maintain or increase tree crown cover over the last 10 years and tillage was abandoned (HMdG Forest Management Plan, 2009; landowners personal communication).

In fact, due to correct management practices, the estate won the Cork Oak Sustainability and Biodiversity award in 2009 attributed by Corticeira Amorim (cork industry), the Forest National Authority (AFN), Biodiversity and Nature Conservation Institute (ICNB) Quercus (Environmental NGO) and WWF (environmental NGO) . The HdMG has a Forest Stewardship Council (FSC) Forest Management Certificate since 2008.The HMdG also provides support to some R&D projects such as a demonstrative project (Extensity Project) on sustainable management farming (contributing with over 90 ha for biodiverse grassland meadows) and another project involving carbon sequestration, with an installed tower measuring the amount of carbon stored in roughly 140 ha of newly installed biodiverse grasslands (HMdG Forest Management Plan, 2009; landowners personal communication).

FIGURE 4
Location of HMdG in Chamusca, Ribatejo.



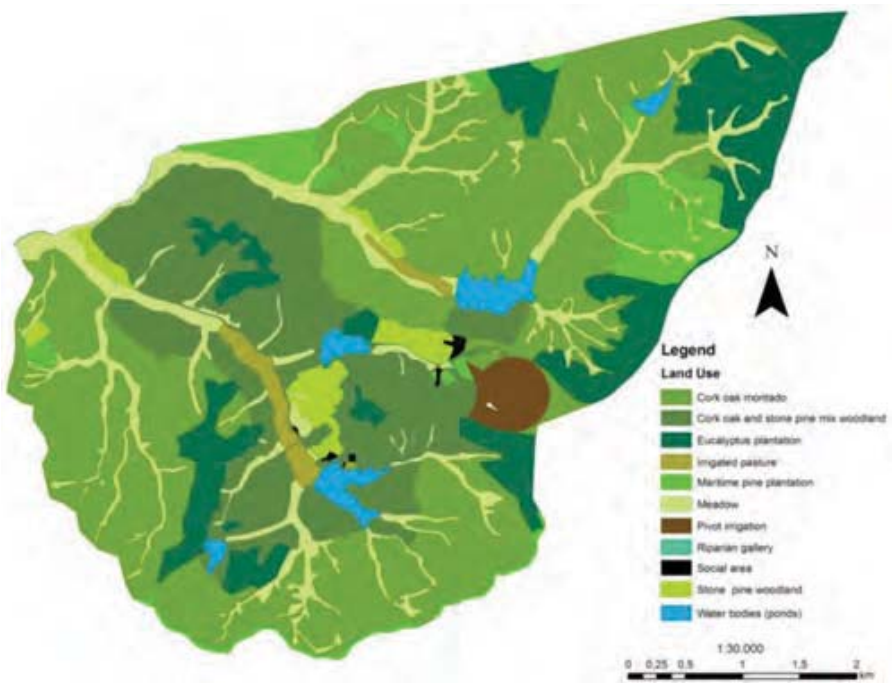


FIGURE 5
HMdG, respective land uses.

TABLE 1
Land use, description and respective area in hectares.

LAND USE	AREA (HA)	DESCRIPTION
Cork oak (*Quercus suber*) Montado	1017	Cork oak is the dominant tree species (91%). There are some disperse stone pines and maritime pines. Cork production is main extractive activity in the HMdG. Cork is harvested from each tree in cycles of 9 years.
Cork oak and stone pine mix woodland	464	Mixed woodland of coark oak and stone pine with some disperse maritime pine. Like in the Montado area, the cork oaks are harvested for cork every 9 years. Stone pines are harvested for pine nuts.
Eucalyptus plantation (*Eucalyptus globulus*)	340	Pure eucalyptus plantation from the 60's and 70's with the objective of wood production to supply the pulp industry.
Irrigated pasture	33	The pasture areas support cow husbandry with the objective of meat production.
Maritime pine (*Pinus pinaster*) plantation	139	Pure plantation of maritime pine with some natural regeneration of cork oak. The main objective is wood production, resin is not harvested.
Meadow (*or non-irrigated pasture*)	280	The pasture areas are dedicated to cows with the objective of meat production.
Pivot irrigation	36	Agricultural irrigated area.
Riparian gallery	4	Area with other broadleafed species with conservation management objectives, regarding water supply and biodiversity.
Social area	4	Area occupied by buildings.
Stone pine (*Pinus pinea*) woodland	54	Pure stone pine plantation. The main objective of the area is pine production to harvest pines.
Water bodies (*artificial ponds*)	52	Water reservoirs to irrigate pastures and the pivot area, as well as for animal drinking. Some fishing activities take place here.

3.3. Ecosystem Services Assessment

Ecosystem Sesrvices assessment (Table 2) where chosen according to their relevance and based mainly on work by Groot et al. (2002), MEA (2005), on the report 'Special Benefit from Ecosystem Services – Economic Assessment of the King Conservation District' (2006), Figueroa & Pasten (2009) and EEA Technical report n. º 3 (2010).

TABLE 2
Ecosystem Goods and Services with respective functions and identification of what the landowner (beneficiary) receives. The supporting services are highlighted for reference, not being included in the study as they do not benefiate people directly. Some of the provisioning and regulating services possess a direct link with the supporting services (adapted from Figueroa & Pasten, 2009, and thus are marked with a *. Some ES are indicated as potential because they could be developed in the study area but currently are not used.

Ecosystem Services Categories	Ecosystem processes and components (Functions)	Services and Goods provided (What the beneficiary receives)
1. Supporting (services such as primary production, soil formation, or nutrient cycling, necessary for ecosystem functioning and for the production of provisioning goods and services, regulating and cultural services)		
2. Provisioning (Provision of natural resources)		
2.1 Food (Food production)		
2.1.1 Hunting	Availability and variety of game apecies	Game species (e.g. ducks, partridges, rabbits, wild boars, etc)
2.1.2 Natural Food Harvesting (potential for the landowner)	Availability and variety of natural food	Mushrooms, wild berries, aromatic plant species, honey, etc
2.1.3 Fishing	Availability and variety of commercially important fish species	Commercially important fish species
2.1.4 Livestock (cattle)	Availability of areas capable of meeting/maintaining livestock needs	Beef, dairy products, organic fertilizers, leather, etc (other by-products are possible)
2.1.5 Agriculture	Availability of areas capable of producing crops and pastures	Crops and pastures for livestock grazing
2.2 Endogenous Resources (Resources that exist in the area and are used in the homestead production)		
2.2.1 Availability of Fresh Water	Filtering, retention and storage of fresh water (e.g. in aquifers or waterbodies)	Water for consuming uses: fresh drinking water, drainage and irrigation for agriculture and vegetation formations. Water for hydroelectricity and industrial processes
2.3 Forest Products (Production of forest products, attained trough forest exploitation and management)		
2.3.1 Wood	Availability of areas capable of producing plantations/woodlands exploited for timber	Timber
2.3.2 Other Forest Residues	Availability of forested areas capable of producing other forest residues	Biofuel, firewood, etc
2.3.3 Cork	Availability of forested areas capable of maintaining cork production	Cork
2.3.4 Cones, resins, etc	Availability of forested areas capable of producing cones, resins, etc	Cones, resins, etc
2.4 Plant and Animal Resources (Genetic material, evolution and diversity in wild plants and animals with economic interest)		
2.4.1 Genetic Resources	Existent genetic information of animals and plants which can either be banked for future uses or employed in biotechnology and in products development in general	New products development, genetic varieties banking (e.g. the cows produced represent an unique autochthonous breed)
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	Diversity of animals and plants with medicinal importance (or potentially important) and with relevance for the cosmetic industry	Availability of raw materials for the pharmaceutical and cosmetic industries. New products development with special interest for medicine and for the cosmetic industry

Ecosystem Services Categories	Ecosystem processes and components (Functions)	Services and Goods provided (What the beneficiary receives)
3. Regulating (Maintenance of essential ecological processes and life support systems)		
3.1 Cycles (Regulating services that aredependent on process cycle with various interactions)		
3.1.1 Soil protection and formation, erosion control*	Prevention of eolic erosion, surface runoff and other removing processes, maintenance of arable soil and its productivity. Role of vegetation root matrix and soil biota in soil retention, weathering of rock and accumulation of organic matter	**Maintenance of arable land and its productivity, prevention of damage from erosion/siltation, maintenance of natural productive soils**
3.1.2 Water Regulation*	Runoff, flood and aquifer recharge synchronization, water storage and retention in watersheds, reservoirs and aquifers, nutrient transport	**Drainage and natural irrigation, medium for transport**
3.1.3 Nutrient Regulations *	Role of biota in storage and re-cycling of nutrients	Availability of nutrients to plants, nutrient release anf fixation
3.1.4 Pollination	Role of biota in movement of floral gametes	Pollination of wild plants and crops
3.1.5 Local climate regulation* (carbon)	Land cover can affect local temperature and precipitation, ecosystems affect greenhouse gas sequestration and emissions	Climate amenization, carbon sequestration
3.2 Depuration (Removal of impurities/contaminants trough the action of biophysical components of ecosystems)		
3.2.1 Soil Bioremediation	Soil bioremediation trough the action of land cover and soil biota, amenization of soil contamination	Presence of uncontaminated soil (or easily recovering from contamination) which in turn affects soil production and support
3.2.2 Residues/pollutants treatment	Removal of pollutants through storage, dilution, transformation and burial as	Absence of residues/pollutants
3.2.3 Water Purification	Water purification through the action of plant communities (e.g. riparian vegetation), water and sediment related biota. Filtering and decomposition of organic residues trought sediment permeability and in aquifers (see soil types in section 3.2)	Water quality, availability of purified water, for human or for wild/dosmetic species use. Prevention of diseases caused by water quality
3.2.4 Air quality*	Air-quality maintenance, ecosystems contribute chemicals to and extract chemicals from the atmosphere	Air quality (CO2/O2 balance, SOx), influence on climate, prevention of diseases caused by air quality
3.3 Prevention (Influence of ecosystem structure on dampening disturbances)		
3.3.1 Flood Buffer zones	Infiltration and retention capacity in areas not easily destroyed by floods and near flood prone zones (e.g. riparian vegetation can help contain an overflown river). Soil type and land cover play important roles	Decreased flood risk (or decreased fire impact in case of occurrence), reduction of economic/ social/ environmental costs associated with this kind of disturbance
3.3.2 Fire prevention/control	Capacity to repond to fire disturbances or to prevent them, mainly trough the land use present acting as a natural barrier/break (such as streams or water bodies or representing a land cover easily controlled in case of a fire	Decreased fire risk (or decreased fire impact in case of occurrence), reduction of economic/ social/ environmental costs associated with this kind of disturbance

Ecosystem Services Categories	Ecosystem processes and components (Functions)	Services and Goods provided (What the beneficiary receives)
	(low density woodlands with natural protection against fires such as Cork Oak Montados or with low vegetative growth such as pastures and meadows mainly composed by herbaceous plants)	
3.3.3 Pest and disease prevention	Pest and disease population control through trophic-dynamic relations and through natural barriers (e.g. habitat mosaic consisting of areas not suitable to pest/disease occurrances)	Control of pests and diseases with increased reduction of herbivory and mortality (crop and other damage)
3.3.4 Invasive species control	Invasive species control through trophic-dynamic relations and through natural barriers.	Control of pests and diseases with increased reduction of herbivory and mortality (crop and other damage
3.3.5 Grazing fields control	Vegetation control mainly trough cattle grazing (wild animals coul also play a part)	Presence of areas less prone to fires and excessive vegetative growth
3.4 Habitat functions (Suitable living and feeding space and reproduction habitat for wild plants and animals		
3.4.1 Habitats Maintenance*	Maintaining existing habitats in good conservation status for wild plant and animal species	Presence/maintenance of local and migratory species and habitats
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species	Maintaining HCVAs in good conservation status as well as endangered wild plant and animal species	Presence/maintenance of local HCVAs and endangered species (local and migratory)
3.4.3 Biodiversity Bank functions	Maintaining of biological & genetic diversity, the basis for most other functions	Maintenance of biological & genetic diversity
4. Cultural (Aesthetic, spiritual, educational and recreational functions of ecosystems)		
4.1 Human Well-Being (Providing physical and emotional conditions, inspiration and aesthetics for human well-being)		
4.1.1 Recreation Activities (potential)	Diversity (and quality) in land uses with recreational uses	Travel to natural ecosystems for outdoor activities, etc.
4.1.2 Tourism/Eco-tourism (potential for the landowner)	Diversity (and quality) in land uses with tourism/eco-tourism uses	Travel to natural ecosystems for tourism/eco-tourism
4.1.3 Landscape	Presence of attractive landscape features	Enjoyment of scenery
4.2 Educational (Providing opportunities for cognitive development)		
4.2.1 Education/Interpretation	Variety in nature with educational and interpretation value	Educational and interpretation activities with increased cognitive development
4.2.2 Scientific Research/ Ecological Knowledge	Variety in nature with scientific value and/or contributing to advances in ecological text knowledge - text missing	Scientific research results and increased ecological knowledge

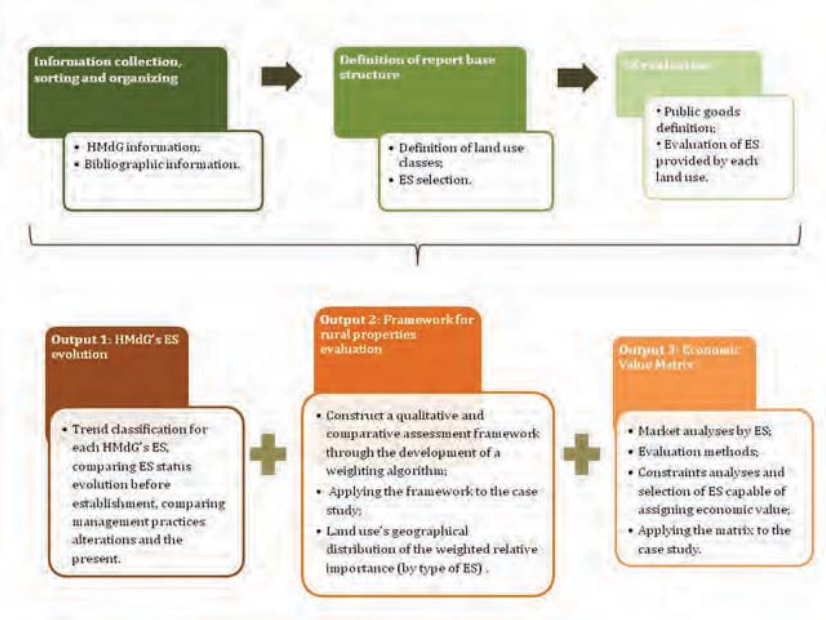
4. METHODOLOGY

'The project was carried out in three phases:

- PHASE I – In the first phase all information needs were accessed and listed with the corresponding sources to obtain them. The methodology was defined and a preliminary assessment scheme was designed;
- PHASE II – Needed information was gathered, sorted, prioritized and defined methodology applied. Some methods were readjusted;
- PHASE III – The third and last phase involved the algorithm application (output 2) and assigning of economic value in total economic value matrix. Finally results were presented and the final report presented.

Methodology is presented as a scheme in Figure 6, linking processes and outputs. In the results section some parts are explained in greater detail (e.g. the algorithm and calculating formulas for Output 3) in order to clarify results.

FIGURE 6
Methodology scheme.



5. RESULTS

5.1. Ecosystem Services: Private, Shared And Public

Given the ES and land use classes defined in Table 1, further analysis was dependent on the identification of which land uses provided each ecosystem good and/or service, one of the main objectives, Table 3 summarizes the results. Analysis was mainly dependent on management of the different areas (e.g. woodlands and Montados possess richer understories than plantations thus providing more services) and general knowledge of the different land use systems and the mosaic composed whitin the property (information attained trough the Forest Management Plan and GIS, personal communications of the landowner and information gathered during the field visits). Furthermore, determining the beneficiary of a certain ecosystem service or good is another of the main goals of the project.

Payments for ES, no matter the scheme implied or who pays for it, should privilege public services, which's the beneficiary is the community, and secondly shared services and goods that benefit both the landowner and the community, being the landowner management responsible for providing them.

This assumption is based on the presuppose that goods that benefit solely the landowner generally posses a market, or in the case of some services contribute actively to lower costs and risks of market based ES, and thus an associated economical return, besides the benefit of the service or good in itself, the results are shown in Table 3 (last column)

The present results portrait the current situation at the case study, management and/or property internal functioning changes (e.g. fencing the property and forbidding access to the community) may alter the beneficiaries and thus require further analysis

TABLE 3
ES by land use and beneficiaries: CO – Cork Oak Montado; CO+SP - Cork oak and stone pine mix woodland; EUC - Eucalyptus plantation; IP – Irrigated pasture; MP - Maritime pine plantation; ME – Meadow; PI - Pivot irrigation; RG - Riparian gallery; SA – Social area; SP - Stone pine woodland; WB – Water bodies; L – Landowner; C –

ES	CO	C0+SP	EUC	IP	MP	ME	PI	RG	SA	SP	WB	BENEFICIARIES
1. Supporting												
2. Provisioning												
2.1 Food												
2.1.1 Hunting	X	X	X	X	X	X		X		X	X	L
2.1.2 Natural Food Harvesting (potential for the landowner)	X	X		X		X		X		X	X	C
2.1.3 Fishing											X	L
2.1.4 Livestock	X	X		X		X						L
2.1.5 Agriculture							X					L
2.2 Endogenous Resources												
2.2.1 Availability of Fresh Water								X			X	L
2.3 Forest Products												
2.3.1 Wood		X	X		X					X		L
2.3.2 Other Forest Residues	X	X	X		X					X		L
2.3.3 Cork	X	X										L
2.3.4 Cones, resins, etc		X								X		L
2.4 Plant and Animal Resources												
2.4.1 Genetic Resources	X	X		X		X	X	X		X	X	S
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	X	X						X		X	X	S
3. Regulating												
3.1 Cycles												
3.1.1 Soil retention and formation, erosion control*	X	X	X	X	X	X	X	X		X		L
3.1.2 Water Regulation*	X	X	X	X	X	X	X	X		X	X	S
3.1.3 Nutrient Regulations *	X	X	X	X	X	X	X	X		X	X	L
3.1.4 Pollination	X	X		X		X	X	X		X		S
3.1.5 Local climate regulation* (carbon)	X	X	X	X	X	X	X	X		X	X	C
3.2 Depuration												
3.2.1 Soil Bioremediation	X	X	X	X	X	X		X		X		L
3.2.2 Residues/pollutants treatment	X	X	X	X	X	X		X		X		L
3.2.3 Water Purification	X	X	X	X	X	X		X		X	X	S
3.2.4 Air quality*	X	X	X	X	X	X	X	X		X	X	C
3.3 Prevention												
3.3.1 Flood Buffer zones	X	X						X		X	X	L
3.3.2 Fire prevention/control	X	X		X		X	X	X			X	S
3.3.3 Pest and disease prevention	X	X		X		X		X			X	S
3.3.4 Exotic species control	X	X		X			X		X			S
3.3.5 Grazing fields control	X	X		X		X						L
3.4 Habitat functions												
3.4.1 Habitats Maintenance*	X	X			X	X		X		X	X	S
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species	X	X						X			X	S
3.4.3 Biodiversity Bank functions	X	X						X			X	C
4. Cultural												
4.1 Human Well-Being												
4.1.1 Recreation Activities (potential)	X	X		X		X			X	X	X	C
4.1.2 Tourism/Eco-tourism (potential for the landowner)	X	X		X		X		X	X	X	X	C
4.1.3 Landscape	X	X		X		X		X		X	X	C
4.2 Educational												
4.2.1 Education/Interpretation	X	X	X	X	X	X	X	X	X	X	X	C
4.2.2 Scientific Research/ Ecological Knowledge	X	X	X	X	X	X	X	X		X	X	S

The results in Table 3 are briefly explained below:

2.1.1 Hunting – Hunting is carried out in all land uses except for the social areas and the pivot irrigated area, thus this ES is provided by all the other land uses. Having a private management, hunting is an ES benefited by the landowner only;

2.1.2 Natural Food Harvesting (potential for the landowner) – This ES is provided in all land uses except for those that are more artificial, social areas, or with more frequent management actions due to its production objectives, eucalyptus and maritime pine plantations and the pivot irrigated area. It is considered an ES with community benefits; the landowner does not harvest natural foods, and thus does not possess a direct profit (only potential). Some harvesting is carried out by the community although this situation, depending on the type of natural food, might arise some conflicts with the landowner if he decides to harvest this type of goods;

2.1.3 Fishing – Fishing occurs in the five artificial dams that exist in the estate, being the only land use that provides this ES. Fishing has a private management as does hunting, being an ES benefited solely by the landowner;

2.1.4 Livestock – Livestock production is dependent on grazing gounds, taking place in the Cork Oak Montado and in the cork oak and stone pine mix woodland understory and in the meadows and irrigated pastures. Livestock production has an economic benefit for the landowner being a private benefit ES;

2.1.5 Agriculture – Agriculture is carried out at the pivot irrigated area, being the only land use that provides this ES. Agricultural production has an economic benefit (or is used internally as livestock food) for the landowner being a private benefit ES;Timber extraction has an economic benefit for the landowner being a private benefit ES;

2.2.1 Availability of Fresh Water – This ES refers to water stored or flowing at the surface, available for production purposes or human consumption. Both the water bodies and the riparian gallery deliver this ES. As water is used for the benefit of production the landowner is the only beneficiary.

2.3.1 Wood – This ES is delivered in all the land uses that are managed to extract timber (it may not be the only management objective), eucalyptus and maritime pine plantations and also in stone pine mixed woodland and plantation (all in this case the primary objective is cone production).

2.3.2 Other Forest Residues – An ES delivered in all woodland or tree plantation land use. Once again this ES has an economic benefit for the landowner (both by selling and using as biofuel and firewood) being a private benefit ES;

2.3.3 Cork – This ES is delivered in land uses with Cork Oak trees, in the Montado and in the mixed woodland. Cork extraction has an economic benefit for the landowner being a private benefit ES;

2.3.4 Cones, resins, etc. - This ES is delivered in land uses with stone pines, in the mixed woodland and in the pure plantation/woodland. Cone extraction has an economic benefit for the landowner being a private benefit ES;

2.4.1 Genetic Resources – Genetic resources refers both to animals and plants, the diversity within the species that might help to cope with environmental changes and promote optimized production. Genetic variability within tree species (in areas managed extensively like the cork oak and stone pine woodlands and the mixed woodland), in the woodlands and Montado understory (especially in biodiverse pasture grounds, which in turn serves as grazing fields for cattle from regional breeds), in and around water bodies, in the riparian gallery and in the pivot irrigated area (different agricultural varieties could be more productive or coupe better with environmental changes than others) could benefit both the landowner and the community, with the property acting as a genetic resources bank that might be very useful in the future;

2.4.2 Medicinal species and with interest for the cosmetic industry (potential) – This ES, as there is no list of species with this characteristics for the property, is potential and land uses that might provide it include land uses rich in shrubs and herbs and also natural or semi-natural areas such as woodlands, Montado, the riparian gallery and the water bodies. This species possess an economical value, so there is a potential benefit for the landowner and also as they are used in the medicinal and in the cosmetic industry, the community might benefit from the ES through the use of products composed by such species;

3.1.1 Soil retention and formation, erosion control – This ES is provided mainly due to plant root activity, so all land uses with a vegetation cover should be able to provide it (with variable quality and capacity). It is clearly a landowner benefit as these processes occur locally and soil is the basis for agroforestry production. On the other hand erosion control, when not effective, has costs for the landowner;

3.1.2 Water Regulation – Water regulation is dependent on infiltration and retention areas, and in the absence of blockages to normal water flow. The vegetation cover trough root action and soil permeability (allowing for aquifer recharge, etc.) are very important to the correct maintenance of this ES, all land uses except for the social areas contribute to it and is a landowner and community benefit, as efficient water regulation benefits all and its scale of action is bigger than the property itself, having land management an impact on the whole region (as the property as at the beginning of the watershed);

3.1.3 Nutrient Regulations – Nutrient regulation is dependent on vegetation cover trough root action and soil permeability and biota. All land uses except for the social areas contribute to it, a landowner benefit, as is a local process that accounts for efficient plant growth within the property (e.g. that has a big impact in production). On the other hand a deficient nutrient regulation or a local nutrient contamination might have impacts on a broader scale with negative impact in the community;

3.1.4 Pollination – Except for eucalyptus and maritime pine plantations (highly managed understories with little interest as pollinator attractive species are concerned) and social areas, all the other land uses possess plant species capable of attracting and maintaining pollinator populations. The maintenance of this ES benefits both the landowner (crops pollination) and the community, as pollinator species and populations from the property might travel considerable distances and provide the pollination service around the community;

3.1.5 Local climate regulation (carbon) – This ES referes only to the climate regulation processes that occur locally and to carbon sequestration whitin the property. All land uses with a vegetation cover provide this ES (aquatic vegetation is included but water can also act as a sink), as the impact of carbon sequestration is felt at a scale broader than the property size the benefit is felt by the community and beyond being a truly public good;

3.2.1 Soil Bioremediation – This ES is highly dependent on vegetation cover and on soil biota. Highly irrigated areas (as a pivot irrigated) might play an opposite role as water might transport excess nutrients and other chemicals to soil acting against bioremediation. Only three land uses do not provide this ES, social areas, the pivot irrigated area and the water bodies. This is a local process (due to the nature and low impacts that property activities possess on the environment), soil contamination and bioremediation both possess impacts at the property level being, when it is effective, a benefit to the landowner;

3.2.2 Residues/pollutants treatment – This ES is highly dependent on vegetation cover and on soil biota. Highly irrigated areas (as a pivot irrigated) might play an opposite role as water might-transport excess nutrients, residues and pollutants to soil acting against treatment. Only three land uses do not provide this ES, social areas, the pivot irrigated area and the water bodies

This is a local process (due to the nature and low impacts that property activities possess on the environment), residues/pollutants treatment possess impacts at the property level being, when it is effective, a benefit to the landowner;

3.2.3 Water Purification – This ES is highly dependent on vegetation cover, soil and sediment structure and biota. Highly irrigated areas (as a pivot irrigated) might play an opposite role as water might transport excess nutrients, residues and pollutants to aquifers. Only two land uses do not provide this ES, social areas and the pivot irrigated area. Water purification is both a benefit to the landowner, as water is used with no purifications costs, and to the community for the same reasons as water flows to properties downstream;

3.2.4 Air quality – This ES is highly dependent on vegetation cover (including aquatic vegetation) with some gases interactions occurring also with water, being that the water bodies also contribute to air quality. All land uses with a vegetation cover provide this ES (aquatic vegetation is included but water bodies also contribute to air quality and thus are included), as the impact of air quality is felt at a scale broader than the property size the benefit is felt by the community and beyond being a truly public good;

3.3.1 Flood Buffer zones – Woodlands and Montados can retain a lot of water and on the other hand a flood will not destroy them, infiltration is accelerated by roots and understories (and in the case study the soil type also helps with high infiltration rates). Other land uses such as the riparian gallery and the water bodies also provide this ES, the first acting as water channel containment and the second as a reservoir. This ES is benefited by the landowner as it is his production that is being protected trough this service (larger floods might affect the community but a property with HMdG size and structure will mainly possess a local effect); .

3.3.2 Fire prevention/control – This ES is provided by land uses that are rich in water, fire resistant or that act as natural discontinuities such as meadows, open woodlands and Montados. Plantations, due to their monospecific composition and density do not provide this ES. Fire prevention/control is both a benefit to the landowner, as fire may destroy the whole property production, and to the community for the same reasons as an uncontrolled fire may destroy large areas;

3.3.3 Pest and disease prevention – Monospecific forest plantations and agricultural areas are more pest and disease prone, with density being a very important factor that might trigger a pest or disease outbreak, thus all other land uses may act as natural barriers and prevention areas, with natural enemies banks (due to their greater species richness and lower density, making it more difficult for outbreaks occurrence). Pest and disease prevention is both a benefit to the landowner, as pests and diseases may destroy the property production, and to the community for the same reasons as an uncontrolled outbreak may affect large areas;

3.3.4 Invasive species control – Exotic species and seeds may follow different introduction pathways, incuding being carried by animals, wind and water, if the vegetation cover is abundant, adapted and well established the control is more effective. Plantations with short turnover rates (eucalyptus plantations and agricultural pivot irrigated areas) due to more frequent management activities that create soil clearings are more susceptible to the establishment of exotic species. Meadows and pastures are also vulnerable to exotic species installation as there is no shade to limit their growth. Land uses like the Montados, woodlands, plantations with low turnover rates (stone and maritime pine) and streams with well constituted riparian galleries provide this ES. Exotic species possess impacts in production, and my affect both the property and the surroundings as uncontrolled areas grow thus this ES benefit both the landowner and the community;

3.3.5 Grazing fields control – This ES is provide trough grazing, whether from cattle or wild animals, grazing grounds correspond to land uses capable of providing the referred ES, namely Montados, woodlands, pastures and meadows. The landowner is the sole beneficiary of this ES as natural field control lowers the landowner's costs with vegetation cuttings and clearings were needed;

3.4.1 Habitats Maintenance – Land uses managed to maintain their characteristics or with low turnover rates assure habitat maintenance for a great variety of fauna and flora, namely the Montado, woodlands, and pine plantations (nesting grounds for various bird species), pastures and meadows (biodiverse pastures possess a lifespan of 20 years), riparian galleries and water bodies (for aquatic species). Biodiversity is considered a public good (and intrinsically linked to ESs) and habitat maintenance is crucial for biodiversity conservation thus this ES is a benefit both to the landowner, providing biodiversity balance within the property that impacts production and overall conservation state (as this is an important criteria for maintaining the FSC label) and to the community, as the public good it constitutes;

3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species – This ES is a special case of 3.4.1 referring to high conservation value areas and to the existence of critically endangered and endangered species (potential occurrence based on habitat structure and conservation) which only the Montados, the mixed woodlands, the riparian gallery and the water bodies provide (reference to endangered fish species occurrence in the Forest Management Plan). As referred to ES 3.4.1 this ES is benefited both by the landowner and the community;

3.4.3 Biodiversity Bank functions – This ES is provided by biodiversity rich land uses (or potentially rich), which for the case study refer to the Montados, the mixed woodlands, the riparian gallery and the water bodies. Being biodiversity an intrinsically public good and as the impact of this service is broader than the property; this is a benefit for the community;

4.1.1 Recreation Activities (potential) – This ES is only potential within the property, as the landowner does not possess organized recreation activities (some activities might occur sparsely) nor does it possesses an economic benefit. As the property has potential for providing this ES, the sole beneficiary of informal activities is the community. Land uses that provide this ES are those that possess characteristics compatible with outdoor recreation activities, all but the plantations and the riparian gallery (as it constitutes a sensible area where impacts from these types of activities should be avoided). The social areas are also potential providers, as they may act as logistic areas representing basic infrastructures needed in these types of activities;

4.1.2 Tourism/Eco-tourism (potential for the landowner) – As for the latter ES (4.1.1) tourism/eco-tourism is only potential for the landowner, being the community the beneficiary of this ES trough informal activities (e.g. birdwatching and nature walks). The land uses that provide this ES are the same as for the latter coupled with the riparian galleries (although impacts should be accounted for and minimized);

4.1.3 Landscape – Land uses that possess scenic quality and beauty (subjective criteria that is dependent on the community and visitor preferences (REF) but mostly benefiting natural, semi-natural and naturalized landcapes) provide this ES, namely all the land uses referred in 4.1.2 except for the social areas. As landscape (the land use types can be considered landscape units) is viewed from outside, its appreciation is a community benefit, as no landscapes features can be perceived at the property scale;

4.2.1 Education/Interpretation – This ES can be provided by all land use types and on the other hand, as the landowner does not possess a direct benefit from this ES, the community is the beneficiary as visiting the property for education or interpretation purposes, as knowledge should always be considered a public good;

4.2.2 Scientific Research/ Ecological Knowledge – Some scientific research is carried out at the property, on the other hand ecological knowledge can also be attained. Land uses that are necessary to current scientific research and that might contribute with ecological knowledge include all but the social areas. This ES is benefited both by the landowner, as scientific knowledge might help to improve existing field and management conditions, and the community as once again knowledge should always be considered a public good.

5.2. Output 1 – Baseline: Changes In Ecosystem Services

HMdG was an inhabited, dry, nutrient poor sandy area with its land cover mainly composed by Mediterranean shrublands before it was bought by the family back in 1903 (landowner pers.com.). Land use and management in the property has changed a lot since its establishment, mainly to adapt to local ecological, physical and social conditions as well as market pressures, as agriculture is regarded.
Agricultural land use changed from cereals in the beginning of the 20th century, 1920s and 1930s (with the valleys being rented to plant rice and beans), into rice production in the 1940s and 1950s (followed by the construction of two dams that allowed cultivation in the main valleys), changing again to orchards in the 1970s, with greater intensification in the 1980s and the 1990s (with electricity arrival the landowner was able to install pumps to serve higher altitudes). Presently agricultural land is covered with pastures for cattle grazing and a large agricultural area being converted into forest area (40 ha).

The forested area and particularly the Montado, has been managed as an agrosilvopastoral system in roughly the same fashion since the 1940s, when the first cork oak trees were planted. In the 1960s and 1970s, three more dams were constructed and the first eucalyptus plantations appeared in the colder areas of the property. The pasture regime also changed, from goats to sheep in the 1980s to cattle nowadays.

In the last ten years, the property land use has become mostly forest area, with management actions aiming at production enhancing, mainly trough selection of adapted plantations and reconversion of the others, soil protection and Montado improvement, trough regeneration protection and further plantation of trees to higher tree density (in a 350/ha area).

The estate's evolution history coupled with information from aerial photographs (since the early 1940s) and also supported by the work of Orlando Ribeiro, an early XX century Portuguese geographer (Ribeiro, 1945, 1987) made possible the reconstruction of the baseline for the area, regarding ES trends. Although the available information is not compiled in a systematic way and there is not registered data for most of the variables, especially before the property was bought (e.g. only one broad land cover class), this simple exercise, although somehow subjective allows for a temptative understanding of ES evolution in the study area (Table 4)

TABLE 4
Trends for ES within the study area: > increase, < decrease, <> stable, ? not enough information to establish trend

EGS	TREND
1. Supporting	
2. Provisioning	
2.1 Food	
2.1.1 Hunting	>
2.1.2 Natural Food Harvesting (potential for the landowner)	?
2.1.3 Fishing	>
2.1.4 Livestock	>
2.1.5 Agriculture	>
2.2 Endogenous Resources	
2.2.1 Availability of Fresh Water	>
2.3 Forest Products	
2.3.1 Wood	>
2.3.2 Other Forest Residues	>
2.3.3 Cork	>
2.3.4 Cones, resins, etc	>
2.4 Plant and Animal Resources	
2.4.1 Genetic Resources	?
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	?
3. Regulating	
3.1 Cycles	
3.1.1 Soil retention and formation, erosion control*	>
3.1.2 Water Regulation*	>
3.1.3 Nutrient Regulations *	>
3.1.4 Pollination	?
3.1.5 Local climate regulation* (carbon)	>
3.2 Depuration	
3.2.1 Soil Bioremediation	<
3.2.2 Residues/pollutants treatment	<
3.2.3 Water Purification	<
3.2.4 Air quality*	>
3.3 Prevention	
3.3.1 Flood Buffer zones	>
3.3.2 Fire prevention/control	>
3.3.3 Pest and disease prevention	<>
3.3.4 Exotic species control	<>
3.3.5 Grazing fields control	>
3.4 Habitat functions	
3.4.1 Habitats Maintenance*	>
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species	<>
3.4.3 Biodiversity Bank functions	>
4. Cultural	
4.1 Human Well-Being	
4.1.1 Recreation Activities (potential)	>
4.1.2 Tourism/Eco-tourism (potential for the landowner)	>
4.1.3 Landscape	>
4.2 Educational	
4.2.1 Education/Interpretation	>
4.2.2 Scientific Research/ Ecological Knowledge	>

5.3. Output 2 – A Framework For Rural Properties Evaluation

The 'Output 2' is the Framework for Rural Properties Evaluation (Annexx) Annex I. All the ES considered are listed and linked to the management variables evaluated and respective score and criteria. There are four types of variables and thus four types of scores:

- Critical Failure Variable - variables with a yes or no answer, being that a negative answer accounts for an end value of 0 for the referred ES, stopping evaluation of subsequent variables in the ES;
- Penalty Variable – for the variables which no compliance has a penalty of -1 in the end value of the ES;
- Point Variable – variables for which a 1 to 5 score is applicable;
- Benefit Variable: for the variables which compliance has a +1 benefit in the ES end value, 1 being a very low potential.

The score attributed to each ES is an average of the scores for each variable, the maximum value is 5 (even if the end result is superior due to a benefit variable) and the minimum is 0 (even if the end result is inferior due to a penalty variable), which means that it is not accounted for in the map outputs. The one to five scorePoint Variables is a criteria used to rank variables importance from very low (1) to very high (5), following the ranking system suggested by Bugalho (2009). The Management needs are also shown for each ES and linked with the variables in consideration. The use of FSC and PEFC criteria are shown as a reference, since the landowner has both the FSC and PEFC certificates to comprove sustainable forest management. It was considered useful to link information needed to answer mandatory FSC criteria and at the same time portrait the framework variables, allowing that, in future cases, the same amount of variable and management analysis could answer to both certification and ES framework evaluation.

5.3.1. Methodology for 'Output 2': The Calculation Grid

Table 5 shows the results for the calculation grid after applying the Framework for Rural Properties Evaluation to the case study and the interpolation used to rank public, shared and private goods (section 5.1, table 3). The end score for each ES is multiplied by 1 if the variable is a public good, by 0,5 if it is a shared good (both the landowner and the community benefit) and by 0 if it benefits only the landowner. The Final results for each ES group (Provisioning, Regulating and Cultural) are the sums of every result of each of the individual ES whitin the group divided by available points for that group, i.e. the sum of all the points possible if every ES ranked 5, multiplied by the public, shared and private ponderation. Results are shown for each land use; if a land use does not provide a given ES the calculations do not apply.

TABLE 5
Calculation grid end results by group of ES under study and land use: CO – Cork Oak Montado; CO+SP - Cork oak and stone pine mix woodland; EUC - Eucalyptus plantation; IP – Irrigated pasture; MP - Maritime pine plantation; ME – Meadow; PI - Pivot irrigation; RG - Riparian gallery; SA – Social area; SP - Stone pine woodland; WB – Water bodies. The detailed application of the framework is shown in annex

EGS	CO	CO+SP	EUC	IP	MP	ME	PI	RG	SA	SP	WB
1. Supporting											
2. Provisioning											
Total for ES group	9	9	0	5	0	5	1.5	10	0	7	6
Available points for ES group	10	10	10	10	10	10	10	10	10	10	10
Proportion (Total/Available points)	0.9	0.9	0	0.5	0	0.5	0.15	1	0	0.7	0.6
3. Regulating											
Total for ES group	29.67	28.33	5.5	13.83	9.83	13.83	8	31.17	0	12	17.17
Available points for ES group	35	35	35	35	35	35	35	35	35	35	35
Proportion (Total/Available points)	0.85	0.81	0.16	0.4	0.28	0.42	0.23	0.89	0	0.34	0.49
4. Cultural											
Total for ES group	16.5	15.5	4.5	9	4.5	11	3.5	16.5	5	10.5	12
Available points for ES group	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Proportion (Total/Available points)	0.73	0.69	0.20	0.40	0.20	0.49	0.16	0.73	0.22	0.47	0.53

5.3.2. MAP OUTPUTS

The following figures represent the map outputs generated after calculation for each ES group, the results were divided into five categories: 0 to 0,2 – very low importance, 0,21 to 0,4 – low importance, 0,41 to 0,6 – medium importance, 0,61 to 0,8 – high importance and 0,81 to 1 – very high importance.

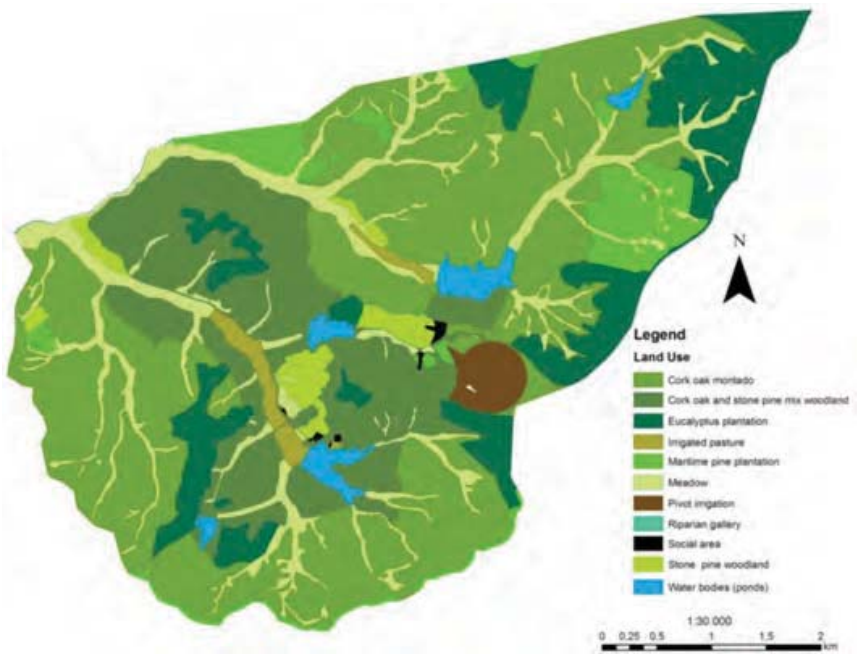


FIGURE 7
Land use map shown for reference.

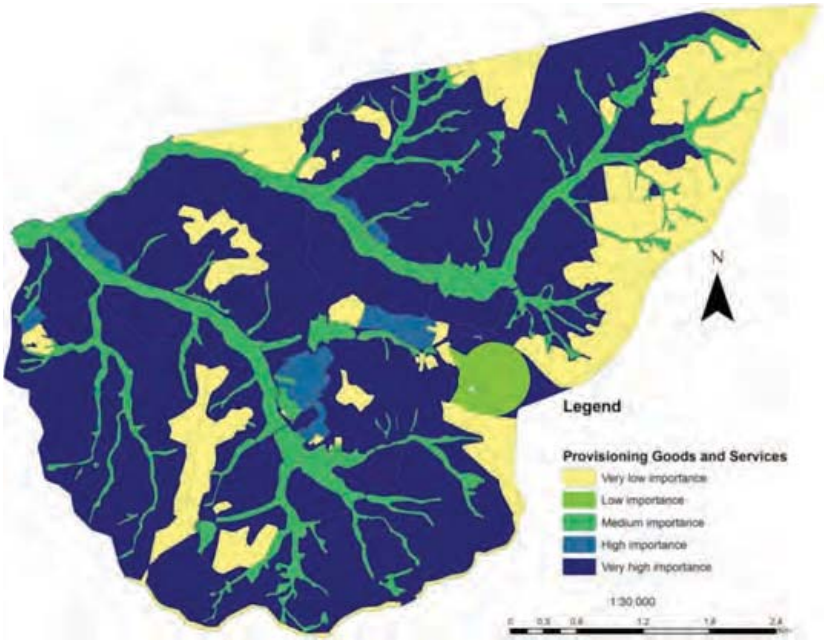


FIGURE 8
Map output for provisioning goods and services.

FIGURE 9
Map output for regulating services.

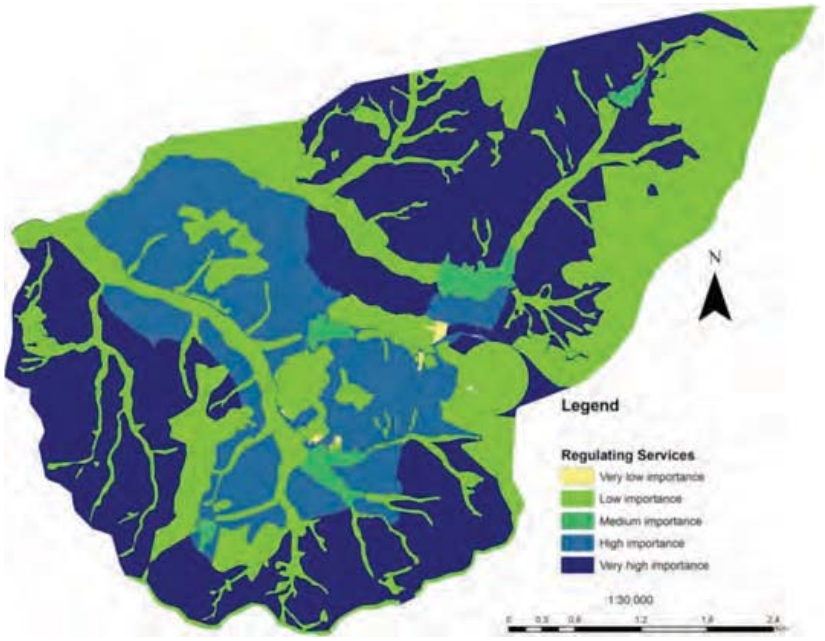


FIGURE 10
Map output for cultural services.

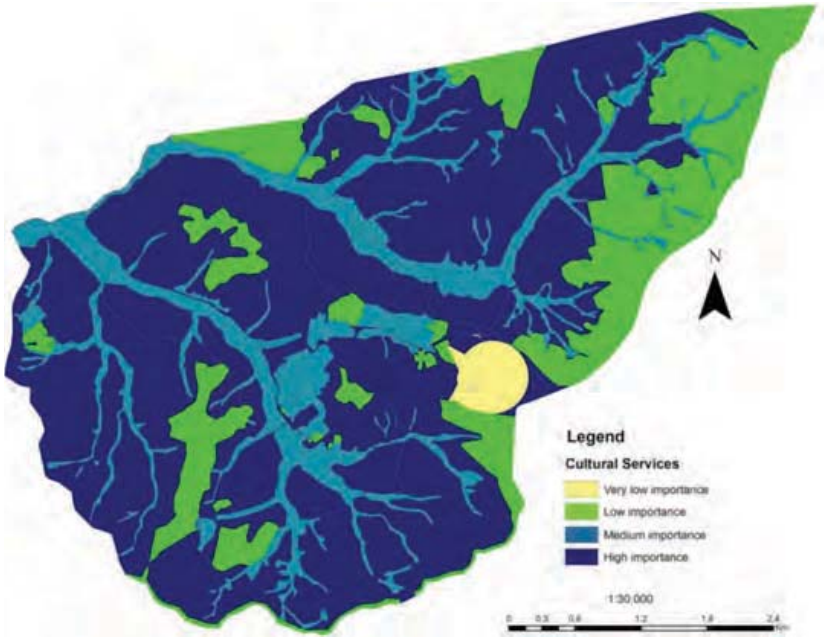
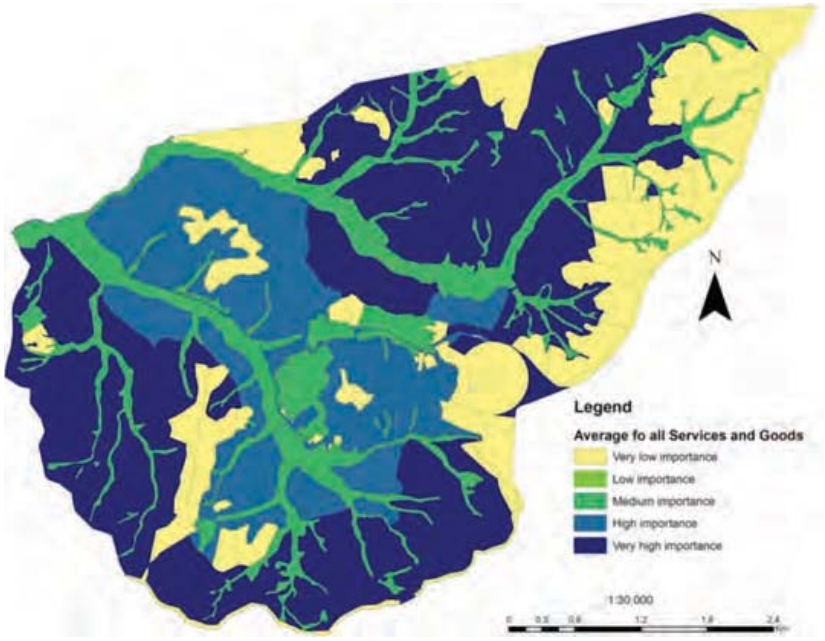


FIGURE 11
Map output with average values for all the ES combined.



5.4. OUTPUT 3 - ECONOMIC VALUE MATRIX

To estimate HMdG ES economic value there was the need to establish some criteria regarding the ES provided and the valuation methods involved. Due to effect of working at a local scale, at land use level, some ES are being provided to a sole beneficiary, the landowner (section 5.2). Iin these cases the ES economic value was not considered. Although the valuation was performed at land use level, not all ES are provided by all land uses (section 5.1). Considering both these factors it was establish that only public and (some) shared ES should be economically valuated.

5.4.1. MARKET ANALYSIS OF LOCAL ECOSYSTEM GOODS AND SERVICES

To the first step was trying to grasp the market/economic value for each ecosystem good or service. Table 6 summarizes the results.

TABLE 6
Preliminary market analysis showing existence or non-existence of ES costs, market, and illustrating which are effective at HMdG: Y- Yes; N- No; I – Internalized (used during the management process); N/A – Non-applicable (when there is no associated market).

ES	COSTS FOR THE LANDOWNER	CURRENT MARKET	DEVELOPED IN HMDG?
1. Supporting			
2. Provisioning			
2.1 Food			
2.1.1 Hunting	Y	Y	Y
2.1.2 Natural Food Harvesting (potential for the landowner)	N	Y	N
2.1.3 Fishing	N	Y	Y
2.1.4 Livestock	Y	Y	Y
2.1.5 Agriculture	Y	Y	I1
2.2 Endogenous Resources			
2.2.1 Availability of Fresh Water	N	Y	I2
2.3 Forest Products			
2.3.1 Wood	Y	Y	Y
2.3.2 Other Forest Residues	Y	Y	Y
2.3.3 Cork	Y	Y	Y
2.3.4 Cones, resins, etc	Y	Y	Y
2.4 Plant and Animal Resources			
2.4.1 Genetic Resources	N	N	N/A
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	N	N	N/A
3. Regulating			
3.1 Cycles			
3.1.1 Soil retention and formation, erosion control*	Y	N	N/A
3.1.2 Water Regulation*	Y	N	N/A
3.1.3 Nutrient Regulations *	Y	N	N/A
3.1.4 Pollination	N	N	N/A
3.1.5 Local climate regulation* (carbon)	N	Y	N
3.2 Depuration			
3.2.1 Soil Bioremediation	N	N	N/A
3.2.2 Residues/pollutants treatment	N	N	N/A
3.2.3 Water Purification	N	N	N/A
3.2.4 Air quality*	N	N	N/A
3.3 Prevention			
3.3.1 Flood Buffer zones	Y	N	N/A
3.3.2 Fire prevention/control	Y	N	N/A
3.3.3 Pest and disease prevention	Y	N	N/A
3.3.4 Exotic species control	Y	N	N/A
3.3.5 Grazing fields control	Y	N	N/A
3.4 Habitat functions			
3.4.1 Habitats Maintenance*	Y	N	N/A
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species	N	N	N/A
3.4.3 Biodiversity Bank functions	N	N	N/A
4. Cultural			
4.1 Human Well-Being			
4.1.1 Recreation Activities (potential)	N	Y	N
4.1.2 Tourism/Eco-tourism (potential for the landowner)	N	Y	N
4.1.3 Landscape	N	N	N
4.2 Educational			
4.2.1 Education/Interpretation	N	Y	N
4.2.2 Scientific Research/ Ecological Knowledge	N	Y	N

5.4.2. General Assumptions

To estimate the economic value of ES at any particular scale some assumptions had to be made as to make possible the assessment of some values. When the data available was based only on the area at the national scale we had to consider the proportionality between HMdG and the national land use cover estimates (Table 7). For the mixed Cork Oak and Stone Pine areas an average was estimated. For the riparian vegetation the other broadleaf species data was considered. All economic values are updated to 2009's real value.

TABLE 7
Forest area by land use. Source: DGRF, 2007 and HMdG Forest Management Plan.

Forest land use	National Area (ha)	HMdG Area (ha)
Cork Oak (Quercus suber)	713,000	1017
Mix forest of Cork Oak and Stone Pine	N/A	464
Stone pine (Pinus pinea)	76,000	54
Maritime pine (Pinus pinaster)	976,000	139
Eucalyptus (Eucalyptus globulus)	672,000	340
Other broadleaf species	67,000	4
Total Portuguese forest area	5,255,000	
Total HMdG area		2,371

5.4.3. General Constrains

There were also several constrains related to the local scale assessment and the scarce data availabil ity for both ecosystem services and base values to work with. Since one of the project goalswas to calculate the ES values for each land use found at HMdG some results were calculated based on the proportionality of the present land use areas. Due to the lack of market values (direct and indirect) for several ES it was only possible to calculate values to some ES and/or some land uses.

5.4.4. Economic Value Matrix

The valuation method and unit price used for calculating the economic value matrix are present in Table 8.

TABLE 8
Valuation method and economic unit value of ES.

ES	Valuation Method	Unit value (€ per physical unit)
2.1.2 Natural Food Harvesting (potential for the landowner)	Market price paid to pickers	€ 3,371/t
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	Market price paid to pickers	€ 3,371/t
3.1.5 Local climate regulation* (carbon)	Market price	€ 14.02/t CO2eq
3.3.2 Fire prevention/control	Cost based method	€ 22.03/ha
3.3.4 Exotic species control	Cost based method	€ 7.04/ha
3.4.1 Habitats Maintenance*	Cost based method	€ 7.04/ha
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species 3.4.3 Biodiversity Bank functions	Cost based method	€ 7.04/ha
4.1.1 Recreation Activities (potential)	Cost Valuation method	€ 3.31/day-visit
4.1.3 Landscape	Cost based method	€ 7.04/ha
4.2.1 Education/Interpretation	Cost Valuation method	€ 3.31/day-visit
4.2.2 Scientific Research/ Ecological	Cost based method	€ 8.36/ha

The values used and calculation methods are as follows, see Table 9 for the final results:
Potential Natural Food Harvesting (2.1.1) and Potential Medicinal species and with interest for cosmetic industry (2.4.2)
In Portugal forest natural food harvesting generally means honey, wild mushrooms and plants/plant parts. About HMdG there was no data regarding honey production. Concerning medicinal species for cosmetic industry there are a wide range of species available in Portugal. We aggregate these two services because information sources were the same to and medicinal plants, which were the ones considered here.
Wild Mushrooms value (€ 2,500/t) was based on the price paid to pickers which is much lower than the selling and exporting price. The production was estimated by Mendes (2004) based on data collected between 1997 and 1999. The proportion for each land use was based on ENF (2007).
Plants production, both cooking and medicinal, was based on selling and exporting data in the period 1988-92. These plants value (cooking € 3,750/t and medicinal € 1,000/t) was also based on the price paid to pickers estimated by Mendes (2004). The proportion for each land use was based on ENF (2007). All the values were updated to 2010 prices.
To calculate the value of Natural Food Harvesting wild mushrooms and cooking plants value were aggregated and Medicinal species and with interest for cosmetic industry was calculated with the medicinal species value.

2.4.1 Genetic Resources (potential)

The potential value of genetic resources from the species that are not explored the owner was not calculated due to the lack of information regarding the possible resources present at HMdG.

3.1.4 Pollination

Although pollination is a much discussed ecosystem service in the case of HMdG it was not possible to calculate is value.

The main reason regards the fact that the majority of studies concerning pollination are related to agricultural crop production (Kremen et al., 2007), which is not the case of our case-study. On the other hand at our working scale it was not possible to estimate its value with the available data.

3.1.5 Local climate regulation (carbon)

Local climate regulation is based on the ability of the forest areas to sequester atmospheric carbon within theyr biomass and on the soil (leaf litter and dead matter). There are several studies that calculate the sinking capacity for different kinds of forest (e.g. Correia et al. 2005 e 2008; Santos Pereira et al. 2008; Nunes & Lopes 2009; Pereira et al. 2009).
So for each land use we considered the following data: cork oak: 3.2 t CO2/ha year (Pereira et al., 2008); stone pine: 5.5 t CO2/ha year (Correia et al. 2008; Santos Pereira et al. 2008); maritime pine: 5.5 t CO2/ha year (Nunes & Lopes 2009); eucalyptus: 44 t CO2/ha year (Correia et al. 2005) and meadow: 5 t CO2/ha year (Pereira et al. 2009). The price of each ton of CO2eq is the Ecotrade market value at 2010-07-30 (€ 14.02/t CO2eq).

3.2.3 Water Purification and 3.2.4 Air quality

Both these depuration ecosystem services are dependent on the HMdG's inputs and outputs and there was no access to that kind of information. Although they are from great importance there are too many external factors that could influence these services performance, even if HMdG had the better practices.

3.3.2 Fire Prevention/Control

HMdG's historical data indicates that for about 100 years there are no fire records, which means that the service of fire prevention/control is being fully delivered, together with the forest management. Although there are some local data regarding fire prevention it is not clear what was spent by Chamusca Municipality on forest fire prevention/control and statistical data (AFN 2010) shows that this is a very low occurrence area. So we choose to consider the national data in DGRF (2007) which includes costs of prevention and fire fighting.

3.3.3 Pest and disease prevention

Although there is available data about the areas affected by pests and diseases (DGRF 2007) most of the valuations about prevention were only to the pine wood nematode on the maritime pine. To the other species the available data was about control.

3.3.4 Exotic species control

Like on fire prevention/control there was no local data concerning exotic species control. Although there some evidence of pest and disease situations there is nothing prescribed as prevention, all activities are planned after a symptom is detected.
The most reliable data is the some considered in fire prevention/control (DGRF 2007), which takes into account information from the National Forest Inventory from 2005-2206 about invasive exotic species, such as Acacia sp., distribution.

3.4.1 Habitats Maintenance, 3.4.2 High Conservation Value Areas (HCVA) and the existence of critically endangered (CR) and endangered (EN) habitats and species, 3.4.3 Functions of a Biodiversity Bank and 4.1.3 Landscape

There was no data collection during the project so the data about the HMdG's existing species (HMdG Forest Management Plan) is based in potential occurrence of species (with a few list of certainties for fauna species) and simple habitat categories (HMdG Forest Management Plan and GIS). Like on the Water Regulation the value of these services was estimated based on Chamusca Municipality's investment and operating expenditures with Biodiversity and Landscape Protection

(INE, 2010). Since there was only one aggregated value to all the services the amount invested was split equally in four.

4.1.2 Tourism/Eco-tourism

As already mentioned there is no specific information about the touristic activity at the local scale and the available information for the Alentejo region is quite biased, so it would not provide an accurate estimation.

4.2.2 Scientific Research/Ecological Knowledge

Scientific projects have been developed at HMdG regarding the cork oak areas and the pastures. So in these case we had information about the investment of HMdG's on this ecosystem service, which allow to have an accurate value for it.

In order to incorporate results attained in output 2 and integrate them with the economic value calculated in output 3, table 9 was produced. All the landuses that scored 3 or below for a given ES were not taken into account when calculating economic values, as their contribution to the ES is very low to medium. Results are shown by hectare in order to compare all landuses in the same basis. Figure 12 shows a map with economic value classes for the case study.accurate estimation.

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TABLE 9
Estimated ecosystem services values by land use hectare (€/year). Landuses for which the result from output 2 does not qualify (end value equal or below 3) are referred as such; cases where the results qualify the landuse but there is no data are also referred. Land use: CO – Cork Oak Montado; CO+SP – Cork oak and stone pine mix woodland; SP – Stone pine woodland; MP – Maritime pine plantation; EUC – Eucalyptus plantation; ME – Meadow; IP – Irrigated Pasture; PI - Pivot irrigation; RG - Riparian gallery; SA – Social Area; WB – Water bodies.

EGS	CO	C0+SP	SP	MP	EUC	ME	IP	PI	RG	SA	WB
2. Provisioning											
2.1 Food											
2.1.2 Natural Food Harvesting (potential)	7.73	11.5	Does not qualify	_	_	Does not qualify	Does not qualify	_	8.66	_	Does not qualify
2.4 Plant and Animal Resources											
2.4.1 Genetic Resources	No Data	No Data	No Data	_	_	No Data	No Data	Does not qualify	No Data	_	Does not qualify
2.4.2 Medicinal species and with interest for the cosmetic industry (potential)	1.26	1.87	1.24	_	_	_	_	_	1.41	_	Does not qualify
3. Regulating											
3.1 Cycles											

EGS	CO	C0+SP	SP	MP	EUC	ME	IP	PI	RG	SA	WB
3.1.2 Water Regulation*	No Data	Does not qualify	Does not qualify	Does not qualify	Does not qualify	No Data	Does not qualify	Does not qualify	No Data	_	_
3.1.4 Pollination	No Data	Does not qualify	Does not qualify	_	_	No Data	No Data	Does not qualify	No Data	_	_
3.1.5 Local climate regulation* (carbon)	44.86	44.86	Does not qualify	Does not qualify	Does not qualify	Does not qualify	Does not qualify	Does not qualify	No Data	_	Does not qualify
3.2 Depuration											
3.2.3 Water Purification	No Data	Does not qualify	N.A.	Does not qualify	Does not qualify	Does not qualify	Does not qualify	_	No Data	_	N.A.
3.2.4 Air quality*	No Data	No Data	No Data	No Data	Does not qualify	Does not qualify	Does not qualify	Does not qualify	N.A.	_	No Data
3.3 Prevention											
3.3.2 Fire prevention/ control	282.83	64.52	_	_	_	No Data	No Data	No Data	3.95	_	No Data
3.3.3 Pest and disease prevention	No Data	No Data	_	_	_	No Data	No Data	_	N.A.	_	No Data
3.3.4 Exotic species control	12.02	6.01	Does not qualify	_	_	_	_	_	No Data	_	_
3.4 Habitat functions											
3.4.1 Habitats Maintenance*	2.35	2.35	Does not qualify	Does not qualify	_	Does not qualify	_	_	2.35	_	Does not qualify
3.4.2 High Conservation Value Areas (HCVAs) and the existence of critically endangered (CR) and endangered (EN) habitats and species	2.35	2.35	_	_	_	_	_	_	2.35	_	Does not qualify
3.4.3 Biodiversity Bank functions	2.35	2.35	_	_	_	_	_	_	2.35	_	1.76
4. Cultural											
4.1 Human Well-Being											
4.1.1 Recreation Activities (potential)	Does not qualify	Does not qualify	Does not qualify	_	_	Does not qualify	Does not qualify	_	_	Does not qualify	Does not qualify
4.1.2 Tourism /Eco-tourism	No Data	No Data	Does not qualify	–	–	Does not qualify	Does not qualify		No Data	No Data	Does not qualify

EGS	CO	C0+SP	SP	MP	EUC	ME	IP	PI	RG	SA	WB
4.1.3 Landscape	2.35	2.35	Does not qualify	–	–	Does not qualify	–	–	2.35	–	Does not qualify
4.2 Educational											
4.2.1 Education/ Interpretation	1.89	1.89	1.89	Does not qualify	Does not qualify	Does not qualify	Does not qualify	Does not qualify	1.57	Does not qualify	No Data
4.2.2 Scientific Research/ Ecological Knowledge	8.36	8.36	No Data	Does not qualify	Does not qualify	8.36	8.36	Does not qualify	–	No Data	No Data
TOTAL	**94.64**	**88.45**	3.13	0	0	8.36	8.36	0	53.37	0	1.76

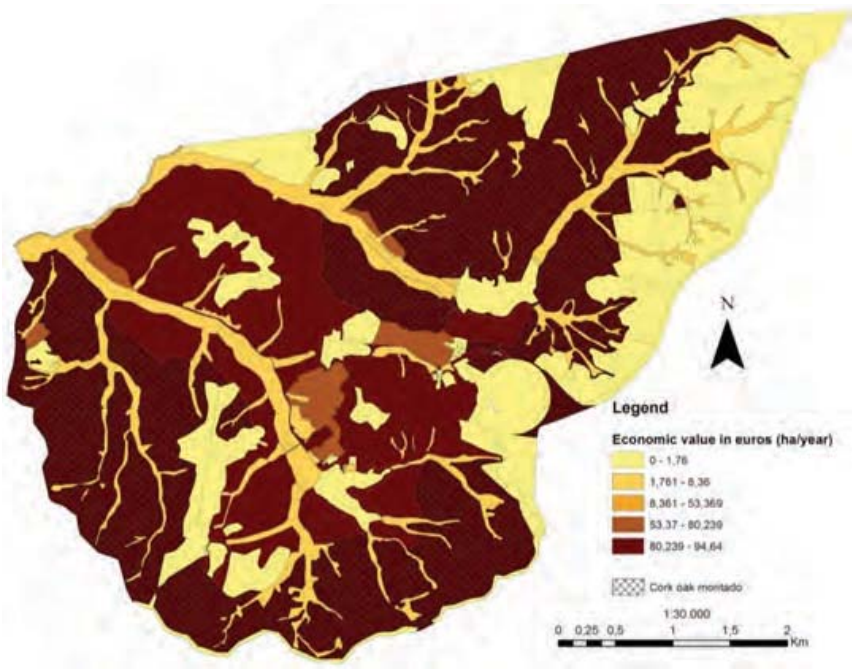

FIGURE 12
Economic value classes for each landuse in the case study (ha/year), Cork Oak Montados are identified.

6. DISCUSSION

In this report, the Ecosystems Services were divided into three groups: Provisioning goods and services, Regulating and Cultural services. A total of 34 ES were analyzed, 15 of them had the landowner as sole beneficiary, 11 benefits the landowner and the community, a shared ES and finally eight were public services, directly benefiting the community, meaning that more than half the ES assessed are public, shared between the community and the landowner or mainly of communitarian use. Discriminating by ES group: Provisioning accounted for a total of 12 ES, nine public, one communitarian/shared and one public; regulating summed a total of 17 ES, six private, eight communitarian/shared and three public; and finally the cultural services had no private ES use, with four public and one shared for a total of five.

One of the main goals of this work was to find if certain land uses provided more ES than others. In fact the number of ES provided by land use varied between three for the social areas to 31 for the cork oak and stone pine mixed woodland. Discriminating by land use: Cork Oak Montado provides 29 ES, 10 private, 11 shared and eight public (the total of public goods under study); cork oak and stone pine mixed woodland provides 31 ES, 12 private, 11 sharedshared and eight public (the total of public goods under study); eucalyptus plantations provide 13 ES, seven private, three shared and three public; the irrigated pasture provides 21 ES, seven of each; maritime pine plantations provide 15 ES, seven private, five shared and three public; meadows provide a total of 22 ES, seven private, eight shared and seven public; the pivot irrigated area provides 11 ES, three private, five shared and three public; the riparian gallery, although in the edge of the property and with a small area provides a total of 25 ES, seven private, 11 shared and seven public; social areas provide a total of three ES, all of them public services; stone pine woodlands provide a total of 24 ES, nine private, eight shared and seven public; and finally water bodies provide 22 ES, 5 private, 9 shared and eight public (the total of public services assessed). Land uses with a lower number of provided ES correspond to plantations (eucalyptus, maritime pine and the agricultural area) and to social areas, these are the more humanized land uses and thus more distant from ecosystem natural functioning. On the other hand, mixed woodlands and Montados provide the highest number of ES, the first providing to additional ES, although both constitute private goods and services. Three of the land uses evaluated provide the whole of public services, i.e., the , Cork Oak Montado, cork oak and stone pine woodlands and water bodies. Although an important indicator, number of ES provided, trends, status and qualitative importance are more informative.

As trends are regarded, even thought the analysis was subjective and based in insufficient data and experience-based knowledge of HMdG changes during last century, the exercise of extrapolation suggests that human pressure is not always synonym of destruction, or ES quality and quantity would decrease. The majority of ES allegedly had a positive trend, accounting for a possible ES increase of value along the decades, with only three ES possibly decreasing, soil bioremediation, residues/pollutants treatment and water purification, this decrease for the referred ES is atemptatively explained, although HMdG management and policy implies minimal agricultural and forest chemicals, nutrients, etc. use, before establishment in 1903 the residues/pollutants and possible water and soil contaminants were probably zero, as it was an inhabited area. Besides the decrease, three other ES maintain the same status and for four others data is insufficient for even a brief qualitative evaluation.

When results from Output 2 are taken into account, results heavily dependent on specific management actions and needs for each land use (see the framework for rural properties evaluation in annex, incorporating the number of ES provided by land use and considering only shared and public services weighted differently trough the use of a algorithm specifically developed for this report.The Cork Oak Montado and the riparian gallery (higher values for provisioning and regulating services) have higher importance and qualitatively comparing to other land uses perform better for all ES groups. As for the lowest values, for provisioning goods and services, eucalyptus, maritime pine plantations and social areas are the ones that perform the poorest, for regulating services, social areas and pivot irrigated areas have the lowest scores and finally for cultural services the lowest are once again eucalyptus and maritime pine plantations.

These results show the same pattern as observed before for the number of ES provided by land use. Riparian galleries and Montados could be considered natural (or natural developing vegetation and structure) and semi-natural ecosystems respectively, thus performing better and at the other end of the spectrum, plantations (trees and crops) and social areas are the more humanized and thus oversimplified versions of ecosystems providing lesser services with lesser overall importance.
The results from the Output 3 confirm the economic relevance of the Cork Oak Montado, because even when not considering the carbon sink values, it is the most valuable land use. Local climate regulation, which is based on the carbon sinking capacity enhances the importance of eucalyptus thus to its high growing rate, but it is almost the only valuable ES that this land use provide. Nevertheless, the carbon sequestered by eucalypthus plantations is a fast rotation product, being rapidly recycled while the amount of carbon sinked in the Cork Oak Montado may grow slower but is virtually everlasting; as long as the landscape is properly manage to endure for centuries ahead. In all ES considered, the Cork Oak Montado, as well as other natural and semi natural habitats like scrublands, spontaneous meadows and wetlands still has many prospective income possibilities.

7. CONCLUSIONS

In order to keep track and become more accountable on what were the report goals, here's a short comeback: 1) exploring the link between ES and spatial/temporal dynamics at the local level; 2) assessing the whole batch of ES; evaluating the ES identified as "public" and "communitarian" or "shared" and 3) exploring the relationship between agroforestry management and the conservation state/trend on selected ES, at the land use level.

Regarding 'Goal 1 - ES spatial and temporal dynamics':
At the local level it is important to understand which land uses provide each ES. The dynamics of spatial and temporal land use at the local level are dependent on landscape complexity and there should be criteria for assessing different plots (minimal areas) with associated ES indicators. Also, when tracking back as far as possible te history of land use and land use changes in the estate, we'll be able to havce a clearer picture. In this case, whe consider that the 'Goal 1' was only partially achieved, since there is no temporal replication that could provide further insights about ES intrinsic and extrinsic dynamics.

On 'Goal 2 – ES private, shared and communitarian benefits':
Assessing ES considering land uses is limitative and does not account for interactions between ES and the multi-scale functionalities of the patchwork of land uses, being highly dependent on precise mapping of land uses at site level. Criteria like minimal areas, habitat connectivity and scenario construction were not addressed, these should be taken into account in future more detailed studies, incorporating field work and data if possible, as a lot of constraints arise from lack of systematized information. Different land uses provide different ES not only based on their nature and structure but also due to scale factors, social and economic realities and constraints, conservation state and associated natural value. Nevertheless, in this report we were able to pinpoint SE at the site level, a functionality that is absolutely crucial when adopting 'Common Agricultural Policy' payment schemes, allowing this methodology to respond proptly at least at an exploratory and immediate level.

'On 'Goal 3 – ES and Agroforestry Management practices'
ES trends on site are linked with HMdG management and landscape impacts since the foundation years (beginning of the XX century). Trends knowledge helps to understand if present management is responsible for ES improvement or otherwise, highlighting the importance of a correct baseline definition that allows the identification of land use and habitat conservation states, accounting for crucial ES, necessary for ecosystem resilience. Forest and farm management has obvious impacts on trends and conservation states, certification models such as FSC and PEFC are quite important and might help with monitoring criteria for ES in the near future and are extremely helpful when bridging ES management and future CAP payment schemes, and using FSC and/or PEFC criteria as a validation and monitoring toolkit.

'The BIG QUESTION'
Some land uses are richer in ES than others; the Cork Oak Montado provides various ES with high scores for most of them. The only other land use that ranked higher in Output 2 was the Riparian gallery (higher provisioning, regulating and combined ES), although if criteria like minimal providing areas or habitat connectivity were taken into account the results would clearly benefit the Cork Oak Montado.
Private goods and services already provide a benefit to the landowner so future ES markets should favor public and shared/communitarian services, creating and building up on economical models focused on them.
The Cork Oak Montados showed the highest total economic value (96,045 €/year) for the area assessed and also when taking into account value by hectare, its value is also superior (94.64 €/year).

Although provisional and debatable, the economic value of Ecosystem Services estimated in this report provides us with a very concise answer: the economic value of the Ecosystem Services provided by agroforestry areas like the Cork Oak Montado and other with similar importance it's NOT zero.

The time has arrived for Society as a whole understands that there is much more about agriculture and foret that food, fiber and fodder that we can easely sell, trade and expeculate on. Farmers and foresters are delivering us clean air, endangered species and fresh water at our doorway everyday, it is more than fair that we learn how to properly compensate them for these vitar products.

8. REFERENCES

. APCOR. 2009. Anuário/Yearbook. Associação Portuguesa de Produtores de Cortiça. 81 pp.
. Aronson, J., Santos Pereira, J., Pausas, J.G. (eds.). 2009. Cork oak woodlands on the edge: ecology, adaptative management, and restoration. Society for Ecological Restoration International, Island Press, Washington, USA;
. Autoridade Florestal Nacional. 2008. Relatório Final do 5.º Inventário Florestal Nacional.
. Autoridade Florestal Nacional. 2010. Estatísticas por freguesia de incêndios florestais 1996-2009. www.afn.min-agricultura.pt;
. Baillie, J.E.M., Hilton-Taylor, C. and Stuart, S.N. (eds.). 2004. IUCN Red List of Threatened Species™. A Global Species Assessment. IUCN, Gland, Switzerland and Cambridge, UK. URL: http://data.iucn.org/dbtw-wpd/commande/downpdf.aspx?id=10588&url= http://www.iucn.org/dbtw-wpd/edocs/RL-2004-001.pdf (last access 21 July 2010);
. Brauman, K.A., Daily, G.C., Duarte, T.K., Mooney, H.A.. 2007. The nature and value of ecosystem services: an overview highlighting hydrological services. Annual Review of Environment and Resources 32, 67–98;
. Brown, T.C.; Bergstrom, J.C. & Loomis, J.B. 2007. Defining, Valuing, and Providing Ecosystem Goods and Services. Natural Resources Journal. 47(2): 329-376
. Büchs, W. 2003. Biodiversity and agri-environmental indicators – general scopes and skills with special reference to the habitat level. Agriculture, Ecosystems & Environment 98: 35 – 78.
. Buckwell, A. 2009. Public Goods from Private Land. Rural Investment Support for Europe (RISE) Foundation;
. Bugalho, M. 2009. Assessing Socio-economic Benefits of Natura 2000 – a Case Study on the ecosystem service provided by the Natural Park of Vale do Guadiana (Portugal). Output of the project Financing Natura 2000: Cost estimate and benefits of Natura 2000 (Contract No.: 070307/2007/484403/MAR/B2). 20 pp;
. Butchart, S.H.M., Walpole, M., Collen, B., van Strien, A., Scharlemann, J.P.W., Almond, R.E.A., Baillie, J.E.M., Bomhard, B., Brown, C., Bruno, J., Carpenter, K.E., Carr, G.M., Chanson, J., Chenery, A.M., Csirke, J., Davidson, N.C., Dentener, F., Foster, M., Galli, A., Galloway, J.N., Genovesi, P., Gregory R.D., Hockings, M., Kapos, V., Lamarque, J., Leverington, F., Loh, J., McGeoch, M.A., McRae, L., Minasyan, A., Morcillo, M.H., Oldfield, T.E.E., Pauly, D., Quader, S., Revenga, C., Sauer, J.R., Skolnik, B., Spear, D., Stanwell-Smith, D., Stuart, S.N., Symes, A., Tierney, M., Tyrrell, T.D., Vié, J., Watson, R.. 2010. Global Biodiversity: Indicators of Recent Declines. www.sciencexpress.org, 29 April 2010, 10.1126/ science. 1187512;
. Câmara Municipal da Chamusca. 2009. Execução Anual do Plano Plurianual de Investimentos; (reference missing from the text)
. Cameron, T., 2002. 2002: the year of the 'diversity-ecosystem function' debate. Trends in Ecology and Evolution 17 (11), 495–496;
. Chee, Y.E.. 2004. An ecological perspective on the valuation of ecosystem services. Biological Conservation 120, 549-565;
. Chris D. Thomas, Alison Cameron, Rhys E. Green, Michel Bakkenes, Linda J. Beaumont, Yvonne C. Collingham, Barend F. N. Erasmus, Marinez Ferreira de Siqueira, Alan Grainger, Lee Hannah, Lesley Hughes, Brian Huntley, Albert S. van Jaarsveld, Guy F. Midgley, Lera Miles, Miguel A. Ortega-Huerta, A. Townsend Peterson, Oliver L. Phillips & Stephen E. Williams. 2004. Extinction risk from climate change. Nature 427, 145-148. doi:10.1038/nature02121
. Commission of the European Communities (CEC). 2004. Integrating environmental considerations into other policy areas – a stocktaking of the Cardiff Process. Commission Working Document, Brussels, 38 pp.
. Correia, A., Evangelista, M., Ochoa, P., Santos Pereira, J. 2008. O sequestro de carbono em ecossistemas de pinhal manso no sul de Portugal. CLIMA 2008 - 1º Congresso Nacional sobre Alterações Climáticas. APEA. Aveiro;
. Correia, A.P., Santos Pereira, J., Pita, G., Carneiro, M., Nogueira, C., Silva, J., Rodrigues, A., Fabião, A., Madeira, M., Banza, J. 2005. Balanço de Carbono no Eucaliptal – Comparação entre o Fluxo Turbulento de CO2 e a Estimativa do Modelo CO2FIX V3.1. 5º Congresso Florestal Nacional. Viseu;
. Costanza, R., d'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Naeem, S.; Limburg, K.; Paruelo, J.; O'Neill, R.V.; Raskin, R.; Sutton, P. and van den Belt, M. 1997.

The value of the world's ecosystem services and natural capital. Nature, 387:253-260;
. Costanza, R., Fisher, B., Mulder, K., Liu, S., Christopher, T.. 2007. Biodiversity and ecosystem services: A multi-scale empirical study of the relationship between species richeness and net primary production, Ecological Economic 61, 478-491;
. Daily, G.C.. 1997. Introduction: what are ecosystem services. In: Daily, G.C. (Ed.), Nature's Services: Societal Dependence on Natural Ecosystems. Island Press, Washington DC, pp. 1–10;
. De Groot 1992 – referred in the text, missing in the list de Groot, R. 2006. Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes. Landscape and Urban Planning 75:175–186;
. De Groot, R.S. de, Wilson, M.A., Boumans, R.M.J., 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics 41, 393–408;
. DGRF – Direcção Nacional dos Recursos Florestais. 2007. Estratégia Nacional para as Florestas. Lisboa, Imprensa Nacional-Casa da Moeda;
. Earth Economics. 2006. Special Benefit from Ecosystem Services – Economic Assessment of the King Conservation District; (reference missing from the text)
. Earth Economics.2006. Special Benefit from Ecosystem Services - Economic Assessment Of The King Conservation District. Report for the King Conservation District, 935 Powell Ave SW, Suite D, Renton, WA 98055, USA. http://www.kingcd.org/pdf/KCD-Special-Benefit-Analysis.pdf
. EEA Technical report, n. º 3, 2010. Ecosystem accounting and the cost of biodiversity losses - The case of coastal Mediterranean wetlands. European Environment Agency, Copenhagen, Denmark;
. ENF 2007 – referred in the text, missing in the list
. FAO State of Food and Agriculture Report, 2007. FAO Economic and Social Development Department, Corporate Document Repository. http://www.fao.org/docrep/010/a1200e/a1200e00.htm Accessed on May 17, 2010;
. FAO. 1993. General Guidelines for the Sustainable Management of Forests in Europe. Helsinki Resolution H1 from the Second Ministerial Conference on the Protection of Forests in Europe.
Farley, J., Costanza, R., Payments for ecosystem services: From local to global, Ecol. Econ. (2010), doi:10.1016/j.ecolecon.2010.06.010;
. Figueroa, B.E., Pasten, C.R., 2009. Total Economic Value Calculating Matrix (TEVCM) to Valuate Ecosystem Services: A Multidisciplinary Step to Promote Conservation. International Human Dimensions Program on Global Environmental Change Open Meeting 2009, Bonn, Germany, 15pp.;
Fisher, B., Turner, R.K., Morling, P., 2009. Defining and classifying exosystem services for decision making, Ecological Economics 68, 643-653;
. Forest Stewardship Council. 2010. FSC Principles and Criteria - STD-01-001 V5-0 Draft 2-0. Charles-de-Gaulle-Strasse 5, 53113 Bonn, Germany. http://www.fsc.org/fileadmin/web-data/public/document_center/Current_consultations/FSC-STD-01-001_V5-0_D2-0_Summary_Comments_2010-03-26.pdf
. FSC - Forest Stewardship Council. 1996. FSC-STD-01-001 (version 4-0) EN - FSC Principles and Criteria for Forest Stewardship;
. Garrity, D.P., 2004. Agroforestry and the achievement of the millennium development goals. Agrofor Syst 61, 5–17;
. Hein, L., van Koppen, K., de Groot, R., van Ierland, E.C. 2006. Spatial scales, stakeholders and the valuation of ecosystem services. Ecological Economics 57, 209– 228;
Heywood, V.H., 1995. Global Biodiversity Assessment. Cambridge University Press, Cambridge UK;
. Holling, C.S., Gunderson, L.H., Peterson, G.D., 2002. Sustainability and panarchies. In: Gunderson, L.H., Holling, C.S. (Eds.), Panarchy, Understanding Transformations in Human and Natural Systems. Island Press, Washington, London. 507 pp;
. Instituto Nacional de Estatística, 2010. Despesas em ambiente dos municípios. www.ine.pt;
. International Assessment of Agricultural Science and Technology for Development, 2008. Executive Summary of the Synthesis Report.

http://www.agassessment.org/docs/SR_Exec_Sum_280508_English.htm. Accessed on May 17, 2010;
. Izac, A.M.N. 2003. Economic aspects of soil fertility management and agroforestry practices. In: Schroth G, Sinclair F (eds.) Trees crops and soil fertility: concepts and research methods. CABI, Wallingford, UK, pp 464;
. Jose, S.. 2009. Agroforestry for ecosystem services and environmental benefits: an overview. Agroforest Syst 76, 1–10;
. Kremen, C., Williams, N. M., Aizen, M. A., Gemmill-Herren, B., LeBuhn, G., Minckley, R., Packer, L., Potts, S. G., Roulston, T., Steffan-Dewenter, I., Vázquez, D. P., Winfree, R., Adams, L., Crone, E. E., Greenleaf, S. S., Keitt, T. H., Klein, A.-M., Regetz, J. and Ricketts, T. H. 2007. Pollination and other ecosystem services produced by mobile organisms: a conceptual framework for the effects of land-use change. Ecology Letters, 10: 299–314.
. Krutilla 1967 – referred in the text, missing in the list
. Layton, D. F.; Siikamäki, J. 2009. Payments for Ecosystem Services Programs: Predicting Landowner Enrollment and Opportunity Cost Using a Beta-Binomial Model, Environment Resource Economics 44:415–439;
. Levin, S.A., 1992. The problem of pattern and scale in ecology. Ecology 73, 1943– 1967;
. Limburg, K.E., O'Neill, R.V., Costanza, R., Farber, S., 2002. Complex systems and valuation. Ecological Economics 41, 409–420;
. Mankiw, N.G. 2006. Principles of Economics. 3rd ed. Harcourt College Publishers;
Matson, P.A., Parton, W.J., Power, A.G., Swift, M.J., 1997. Agricultural intensification and ecosystem properties. Science 277, 504–509;
. MEA - Millennium Ecosystem Assessment, 2005. Ecosystems and human well-being: biodiversity synthesis. World Resources Institute, Washington, DC;
. Mendes, A. 2007a. Valor Económico Total da Floresta Portuguesa: Novas Estimativas. Seminário SPCF - Atribuição de valor aos bens e serviços sem valor de mercado produzidos nos espaços florestais. Coimbra; (reference missing from the text)
. Mendes, A; Feliciano, F., Tavares, M. & Dias, R. 2004. The Portuguese Forests. Country level report delivered to the EFFE Project, Evaluating Financing of Forestry in Europe. Porto: Portuguese catholic university, Porto Regional Center, Faculty of Economics and Management;
. Mooney, H.A., Schulze, E.D. 1993. Biodiversity and Ecosystem Function. Springer, Berlin
Nair, P.K.R., Kumar, B.M., Nair, V.D., 2009. Agroforestry as a strategy for carbon sequestration. J Plant Nutr Soil Sci 172, 10–23;
. Natividade, J.V. 1964. A nova Silvicultura Mediterrânica. Lavoura Portuguesa, n.º11.
. Natividade, J.V., 1949, « O sobreiral do presente e o sobreiral do futuro », Boletim Cortiça, n.º 124.
. Natividade, J.V., 1950, Subericultura, DGSFA, Lisboa.
. Natividade, J.V., 1952, Monserrate e o Culto da Natureza, Direcção-Geral da Fazenda Pública, Lisboa.
. Natividade, J.V., 1952b, « A floresta de sobro mediterrânea », Memorias da Academia das Ciências de Lisboa, Classe de Ciências, Tomo VI.
. Natividade, J.V., 1955, «Panorama da subericultura mediterrânea», Boletim Cortiça, n.º 199.
. Nunes, L. & Lopes, D. 2009. Quantificação do carbono fixado em povoamentos mistos do norte de Portugal. Revista Millenium, 37. Instituto Politécnico de Viseu;
. Pausas, J.G. 1997. Resprouting of Quercus suber in NE Spain after fire. Journal of Vegetation Science 8:703-706;
. Pereira, H. M., Domingos, T., Vicente, L., Proença, V. (eds.) 2009. Ecossistemas e Bem-Estar Humano: Avaliação para Portugal do Millennium Ecosystem Assessment. Escolar Editora.
. Porter, J., Costanza, R., Sandhu, H., Sigsgaard, L., Wratten, S., 2009. The value of producing food, energy, and ecosystem services within an agro-ecosystem. AMBIO: A Journal of the Human Environment 38 (4), 186–193;
. Posthumus, H., Rouquette, J.R., Morris, J., Gowing, D.J.G., Hess, T.M., 2010. A framework for the assessment of ecosystem goods and services; a case study on lowland floodplains in England. Ecological Economics 69, 1510-1523;

. Pretty, J.N., Brett, C., Gee, D., Hine, R., Mason, C., Morison, Rayment, M., van der Bijl, G., Dobbs, T., 2001. Policy challenges and priorities for internalizing the externalities of modern agriculture. Journal of Environmental Planning and Management 44 (2), 263–283;
. Programme for the Endorsement of Forest Certification. 2010. Council Minimum Requirements Checklist - GL 2/2010. (reference missing from the text)
. Randall, A.. 2007. A consistent valuation and pricing framework for non-commodity outputs: progress and prospects. Agriculture, Ecosystems, and Environment 120, 21–30;
. Ribeiro Orlando. 1945. Portugal, o Mediterrâneo e o Atlântico. Coimbra : Coimbra Editora, 245 pp.
. Ribeiro, Orlando; Lautensach, H.; Daveau, S. 1987.Geografia de Portugal. I: a posição geográfica e o território. Edicoes Joao Sa da Costa. Lisboa
. Santos Pereira, J., Bugalho, M.N., Caldeira, M.C. 2008. Do sobreiro à cortiça - Um sistema sustentável. APCOR;
. Sukhdev, Pavan (Coord.). 2009– TEEB -The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature;
. Sukhdev, Pavan (Coord.). 2010. TEEB -Mainstreaming the Economics of Nature: a synthesis of the approach, conclusions and recommendations of TEEB.
http://www.teebweb.org/LinkClick.aspx?fileticket=bYhDohL_TuM%3d&tabid=924&mid=1813
. Turner, R.K., van der Bergh, J.C.J.M., Söderqvist, T., Barendregt, A., van Straaten, J., Maltby, E., van Ierland, E., 2000. Ecological-economic analysis of wetlands: scientific integration for management and policy. Ecological Economics 35, 7–23;
. Vermeulen, S., Koziell, I.. 2002. Integrating Global and Local Values. A Review of Biodiversity Assessment. IIED, London;
. Walker, B.H., Steffen, W.E.. 1996. Global Change and Terrestrial Ecosystems. Cambridge University Press, Cambridge UK;
. Worm B, Barbier EB, Beaumont N, Duffy JE, Folke C, Halpern BS, Jackson JB, Lotze HK, Micheli F, Palumbi SR, Sala E, Selkoe KA, Stachowicz JJ, Watson R. 2006. Impacts of biodiversity loss on ocean ecosystem services. Science. Nov 3;314(5800):787-90.
. Zhang, W., Ricketts, T.H., Kremen, C., Carney, K., Swinton, S.M.. 2007. Ecosystem services and dis-services to agriculture. Ecological Economics 64 (2), 253–260;
. Zurlini, G., Jones, K.B., Li, L., Petrosillo, I. (Lead Author); Robert Costanza (Topic Editor); 2010. Potentials of ecosystem service accounting at multiple scales." In: Encyclopedia of Earth. Eds. Cutler
. J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth June 6, 2010; Last revised June 2, 2010; Retrieved July 27, 2010]
http://www.eoearth.org/article/Potentials_of_ecosystem_service_accounting_at_multiple_scales.

9. ANNEX I

TABLE 10
Framework for rural properties evaluation composed of variables to acess per ES, associated management indicators, FSC and PEFC criteria and the score attributed to each ES, being 1 the lowest and 5 the highest.

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
1. PROVISIONING				
2. FOOD				
2.1.1 HUNTING	•PRESENT - Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•COMPLIANCE WITH NATIONAL AND LOCAL HUNTING LAWS AND ADMINISTRATIVE REQUIREMENTS (E.G. COMPLIANCE WITH LEGAL HUNTING SEASONS);	
	•EVIDENCE OF COMPLIANCE WITH NATIONAL AND LOCAL HUNTING LAWS – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•ADAPTING HUNTING TO GAME LIFE CYCLE SHOULD CONSIDER THE REPRODUCTIVE PERIODS OF INDIVIDUAL GAME SPECIES, WHILE AVOIDING IMPACT ON NON-GAME SPECIES, SPECIALLY ENDANGERED SPECIES (E.G. AVOIDING THE USE OF POISONED BAITS AND TRAPS FOR PREDATOR SPECIES);	FSC 1.1 FSC 6.2
	•HUNTING ADAPTED TO GAME SPECIES LIFE CYCLES – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF A HUNTING MANAGEMENT PLAN – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•TYPE OF MANAGEMENT (PRIVATE VERSUS PUBLIC) AND HUNTING MANAGEMENT PLAN, REGARDING THE PROMOTION AND MAINTENANCE OF HUNTING VALUE THROUGH HUNTING ACTIVITIES THAT PAY ATTENTION TO THE WEIGHT OF GAME SPECIES PRESENT AND THEIR POPULATIONS (E.G. MONITORING OF GAME POPULATIONS, REGISTRATION OF HUNTING RECORDS, PLANS AND LISTS FOR SHOOTING FOR THE DOCUMENTATION OF HUNTING ACTIVITIES ETC.);	
	•DEGREE OF PROMOTION AND MAINTENANCE OF HUNTING VALUE.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW DEGREE (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH DEGREE.		
	•SITE POTENTIAL	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL		
	•IMPACT OF HUNTING ACTIVITIES ON SITE (HUNTING RECORDS: N. º OF HUNTING DAYS AND NUMBER OF HUNTERS IN A GIVEN DAY, ETC.).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).	•MANAGEMENT OF GAME POPULATIONS ACCORDING TO THEIR ORIGIN, NATIVE SPECIES SHOULD BE MAINTAINED AND INTRODUCTIONS MINIMIZED;	
	•IMPACT ON GAME POPULATIONS (N. º OF INDIVIDUALS HUNTED PER SPECIES ACCOUNTING FOR SEX AND AGE RATIOS IN THE POPULATION).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH MPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).	•MONITORING THE INFLUENCE OF GAME ON VEGETATION IS OF PARTICULAR IMPORTANCE (E.G. INSTALLATION OF FENCES AND FOREST OBSERVATION SYSTEMS). WHEN ASSESSING ECOLOGICAL SUSTAINABILITY, PREVENTION OF GAME IMPACT IS PARTICULARLY SIGNIFICANT ESPECIALLY WITH REGARD TO THE PROTECTION OF NATURAL REGENERATION AND SCRUBLAND AREAS (ESPECIALLY IN THE MONTADO UNDERSTORY);	
	•EVIDENCE OF GAME POPULATIONS MONITORING – Y OR N?	BENEFIT VARIABLE: EXISTENCE OF MONITORING EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•IMPACT OF GAME POPULATIONS ON VEGETATION DEVELOPMENT (ECOLOGICAL SUSTAINABILITY).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH MPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).	•MANAGEMENT ACTIONS TAKEN TOWARDS CONSERVATION AND IMPROVEMENT OF THE DIVERSITY OF GAME SPECIES, REGARDING GENETIC DIVERSITY AND GAME HABITATS (E.G. INSTALLATION OF GAME FEEDERS, CREATION OF REFUGE AREAS, MONITORING OF HEALTH STATUS OF THE POPULATIONS, ETC.).	
	•EVIDENCE OF INTRODUCTIONS OF NON-NATIVE SPECIES TO THE AREA – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF ACTIONS TAKEN TOWARDS CONSERVATION AND IMPROVEMENT OF THE DIVERSITY OF GAME SPECIES, REGARDING GENETIC DIVERSITY AND GAME HABITATS – Y OR N?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH MPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•ECONOMIC PROFIT.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW MPACT AND 5 A VERY HIGHT PROFIT		
	•EXISTENCE OF NATURAL FOOD HARVESTING – Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•TYPE OF POLICY AND MANAGEMENT ON NATURAL FOOD HARVEST (PRIVATE VERSUS PUBLIC); •MANAGEMENT AND MONITORING OF NATURAL FOOD PRODUCTION, ACTIONS TAKEN TO MAINTAIN AND INCREASE STOCKS (E.G. COMPLETE LIST OF NATURAL FOODS OCCURRING	
	•EXISTENCE OF CONFLICTS WITH THE LOCAL POPULATION ARISING FROM NATURAL FOOD HARVESTING – Y OR N?	PENALTY VARIABLE: EXISTENCE OF CONFLICTS HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
2.1.2 Natural Food Harvesting (potential for landowner)	•Site potential	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	within the property per area and land use, quantities, quality and impact of harvesting); •Management of ecological conditions necessary to maintain and increase natural food stocks (e.g. management of the understory in woodland areas, livestock impact on harvest areas, maintenance of set-aside and natural areas, etc.); •Management of production and price oscillation, knowledge of market channels (if applicable).	FSC 5.4 FSC 5.5 PEFC B.3
	•Conservation state of harvesting sites.	Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state.		
	•Diversity of natural foods.	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very low diversity and 5 to a very high diversity.		
	•Evidence of maintenance or increase in stocks and/or quality.	Benefit Variable: Evidence of maintenance or increase accounts for a +1 benefit in the ES end value.		
	•Harvesting impact on natural food stocks and quality (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very high diversity and 5 to a very low impact.(or virtually inexistent)		
	•Harvesting impact on harvesting sites and related habitats (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very high diversity and 5 to a very low impact.(or virtually inexistent)		
	•Existence of identifiable market channels and economic profit associated.	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit. If harvesting is exclusively public this criteria is not assessed.		
2.1.3 Fishery	•Present - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local fishing laws and administrative requirements (e.g. compliance with legal fishing seasons); •Adapting fishing to commercial species life cycle should consider the reproductive periods of individual species while avoiding impact on non-fishing species, including other aquatic groups such as amphibians (specially endangered species); •Type of management (private versus public) and fishing management plan, regarding the promotion and maintenance of fishing value through fishing activities that pay attention to the weight of commercial species present and their populations (e.g. monitoring of populations, registration of fishing records, etc.); •Management of commercial species populations according to their origin, native species should be maintained and introductions minimized; •Water quality monitoring; •Management actions taken towards conservation and improvement of the diversity of fishing species, regarding genetic diversity and habitats (e.g. maintaining water habitats such as feeding and nesting grounds, riparian vegetation restoration, etc.).	FSC 5.5 FSC 6.2 PEFC B.3
	•Evidence of compliance with national and local hunting laws – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Fishing adapted to commercial species life cycles – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of a fishing management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Degree of promotion and maintenance of fishing value.	Point Variable: a 1 to 5 score is applicable, 1 being a very low degree or a virtually existence and a 5 a very high degree		
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being low potential (or virtually inexistent). and 5 a very high potential		
	•Impact of fishing activities on site (fishing records: n. º of fishing days and number of fishers in a given day, etc.).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact.(or virtually inexistent)		

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
	•IMPACT ON COMMERCIAL POPULATIONS (N. º OF INDIVIDUALS FISHED PER SPECIES ACCOUNTING FOR SEX AND AGE RATIOS IN THE POPULATION).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•EVIDENCE OF COMMERCIAL POPULATIONS MONITORING – Y OR N?	BENEFIT VARIABLE: EXISTENCE OF MONITORING EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•WATER QUALITY;	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW QUALITY AND 5 A VERY HIGH QUALITY.		
	•EVIDENCE OF INTRODUCTIONS OF NON-NATIVE SPECIES TO THE AREA – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF ACTIONS TAKEN TOWARDS CONSERVATION AND IMPROVEMENT	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•ECONOMIC PROFIT.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW PROFIT (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH PROFIT		
2.1.4 LIVESTOCK 2.1.5 AGRICULTURE	•PRESENT - Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•COMPLIANCE WITH NATIONAL AND LOCAL LIVESTOCK PRODUCTION LAWS AND GUIDELINES (E.G. REGARDING HANDLING AND WELFARE); •LIVESTOCK MANAGEMENT PLAN, REGARDING THE PROMOTION AND MAINTENANCE OF GRAZING AND DRINKING AREAS, ANIMAL ROTATION, HANDLING AND WELFARE. PRODUCTION SYSTEM (EXTENSIVE, SEMI-INTENSIVE OR INTENSIVE) AND CATTLE DENSITY SHOULD BE STATED; •LOCAL OR REGIONAL BREEDS SHOULD BE FAVORED (ADAPTED TO LOCAL CONDITIONS AND MAINTENANCE OF GENETIC DIVERSITY); •ANIMALS SHOULD HAVE ACCESS TO ADEQUATE SUPPLY OF SUITABLE DRINKING WATER AND FEED AND ARE PROTECTED FROM NATURAL DISASTER AND PREDATION; •HABITATS WITHIN GRAZING AREAS SHOULD BE PROTECTED AND OVER EXPLOITATION AVOIDED, PREVENTION OF LIVESTOCK IMPACT IS PARTICULARLY SIGNIFICANT ESPECIALLY WITH REGARD TO THE PROTECTION OF NATURAL REGENERATION AND SCRUBLAND AREAS (ESPECIALLY IN THE MONTADO UNDERSTORY). WATER BODIES AND STREAMS SHOULD ALSO BE PROTECTED AGAINST LIVESTOCK IMPACTS (E.G. MARGINAL VEGETATION DESTRUCTION AND WATER CONTAMINATION DUE TO ORGANIC MATTER ACCUMULATION); •ANIMAL HANDLING FACILITIES SHOULD BE DESIGNED TO MINIMIZE ANIMAL STRESS AND MAXIMIZE ANIMAL COMFORT. ANIMAL WELFARE PROCEDURES SHOULD BE TAKEN WHEN CARRYING OUT HUSBANDRY PROCEDURES; •APPROPRIATE PREVENTATIVE MEASURES SHOULD BE TAKEN FOR ANIMAL DISEASE, TREATING SICK OR INJURED ANIMALS PROMPTLY AND FOLLOWING ANIMAL WELFARE GUIDELINES.	N/A
	•EVIDENCE OF COMPLIANCE WITH NATIONAL AND LOCAL HUNTING LAWS – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF A LIVESTOCK MANAGEMENT PLAN – Y OR N?	BENEFIT VARIABLE: FAVORING OF LOCAL OR REGIONAL BREEDS ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•LOCAL OR REGIONAL BREEDS FAVOURED – Y OR N?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW DEGREE (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH DEGREE.		
	•SITE POTENTIAL FOR LIVESTOCK PRODUCTION (WATER AND FOOD).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT)		
	•PRODUCTION SYSTEM AND CATTLE DENSITY – LOW OR HIGH IMPACT?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•EVIDENCE OF HABITAT, STREAMS AND WATER BODIES PROTECTION (E.G. PROTECTION OF NEW TREES, LIVESTOCK BANNED FROM SENSITIVE AREAS) – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF HABITAT, STREAMS AND/OR WATER BODIES PROTECTION ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EXISTENCE OF IDENTIFIABLE MARKET CHANNELS AND ECONOMIC PROFIT ASSOCIATED.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW PROFIT (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH PROFIT.		
	•PRESENT – Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•MINIMUM TILLAGE SHOULD BE PART OF THE FARMING PRACTICE IN THE SITE (E.G. TO AVOID SOIL EROSION) •COMPLIANCE WITH NATIONAL AND LOCAL AGRICULTURAL LAWS AND ADMINISTRATIVE REQUIREMENTS; •WINTER COVER BY AN INTERCROP SHOULD BE A COMMON FARMING PRACTICE (E.G. TO AVOID SOIL EROSION OR NITRATE LEACHING)	
	•EVIDENCE OF MINIMUM TILLAGE AS PART OF THE ACTIVITIES– Y OR N?	BENEFIT VARIABLE: FAVORING OF MINIMUM TILLAGE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
2.2.1 Availability of Fresh Water	•Evidence of winter cover by an intercrop as part of the farming practices – Y or N?	Benefit Variable: Favoring of intercrops/catch crops cover the soil between the main crops accounts for a +1 benefit in the ES end value.	•Intercrops/catch crops cover the soil between the main crops should be common farming practice (e.g. to increase the soil nutrients) •A water monitoring program must be taken if agriculture practice is taken near water courses (e.g. to avoid water contamination) •Should be created a bank from the genetic resources of the site •The irrigation system should be adapted to the agriculture practice (measure the share of irrigation water applied by different irrigation technologies; there are some crops that use water more efficiently – is the crop adapted to the climatic area?) •Organic farming must be stimulated within the site	
	•Evidence of intercrops/catch crops covers the soil between the main crops – Y or N?	Benefit Variable: Favoring of intercrops/catch crops cover the soil between the main crops accounts for a +1 benefit in the ES end value.		
	•Evidence of a water monitoring program – Y or N?	Benefit Variable: Evidence of water bodies protection accounts for a +1 benefit in the ES end value.		
	•Existence of a plant genetic bank – Y or N?	Benefit Variable: Evidence of a genetic bank of plant species accounts for a +1 benefit in the ES end value.		
	•Evidence of an irrigatio management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Soil nutrient tests should be frequently taken •Research activities should be promoted (e.g. how the practices affect the environment and how they are compared with recommended for legislated) •Maintenance of semi-natural habitats that can act in an efficient pest control management (e.g. beetle banks) should be promoted	FSC 1.1 FSC 6.2
	•Existence of organic farming procedures– Y or N?	Benefit Variable: Evidence of areas with organic farming procedures accounts for a +1 benefit in the ES end value.		
	•Evidence of a soil management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Existence of research activities– Y or N?	Benefit Variable: Evidence of research activities accounts for a +1 benefit in the ES end value.		
	•Evidence of habitat protection (e.g. protection of site aside areas) – Y or N?	Benefit Variable: Evidence of research activities accounts for a +1 benefit in the ES end value.		
	•Site potential for agriculture production	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential and 5 a very high potential.		
	•Type of Activity – Low impact? (1 to 5 – Inverse of the previous)	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Economic profit. Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.		
	2.2 Endogenous Resources			
	•Availability - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local fresh water use laws and guidelines; •Fresh water management plan regarding endogenous use, whether for agricultural or forestry purposes, human consumption or livestock management. Water quality should be regularly tested and consumption should not exceed capacity, maintaining the ecological flow and allowing for resource use further downstream;	FSC 5.5 FSC 6.5 PEFC 4.2.1 PEFC B.5.1
	•Evidence of compliance with national and local water use laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of ecological flow – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Water quality – Low or high quality?	Point Variable: a 1 to 5 score is applicable, 1 being a very low quality and 5 a very high quality.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
	•Impacts of fresh water consumption downstream –Low or high impact?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	•Appropriate conservation practices meant to prevent or reduce the amount of pollution generated by agriculture, forestry practices, livestock management and wastewater, in order to protect and enhance water quality should be in place; •A buffer area dedicated to water resources protection should be in place (e.g. presence of marginal riparian vegetation representing no tillage and no production area), protecting freshwater associated species	
	•Evidence of measures to prevent or reduce fresh water contamination – Y or N?	Penalty Variable: No compliance has a penalty of the end value of the ES.		
	•Presence of buffer protection areas – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	2.3 Forest Products			
2.3.1 Wood	•Present - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local forestry laws and administrative requirements (e.g. maximum harvesting areas); •Adoption of forest management guidelines considering plantation maintenance and adapted to local or regional conditions; •Type of policy and management on wood harvest (private versus public) and forest management plan, regarding the promotion and maintenance of wood value (e.g. production records, harvesting yield, growth rates, etc.); •Native species should be favoured (adapted to local conditions and maintenance of genetic diversity); •Management and monitoring of wood production, actions taken to maintain and increase production (e.g. complete list of wood products within the property per area and land use and impact of harvesting).	FSC 5.6 FSC 6.3 PEFC B.1.2 PEFC B.1.3 PEFC B.3
	•Evidence of compliance with national and local forestry laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of a forest management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Forest management adapted to local or regional conditions – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Site potential. •Harvesting and managing impact on harvesting sites and related habitats (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential and 5 a very high potential. Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Conservation state of harvesting sites.	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.		
	•Native species favoured – Y or N?	Benefit Variable: Favouring of native species accounts for a +1 benefit in the ES end value.		
	•Evidence of actions taken towards conservation and improvement of the diversity of tree species, regarding genetic and habitat diversity – Y or N?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Economic profit.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential and 5 a very high potential.		
	•Present - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local forestry laws and administrative requirements; •Type of policy and management on forest residues (private versus public) and forest management plan, regarding the balance between forest residues removed and left in the field to soil protection;	
	•Evidence of compliance with national and local forestry laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of the end value of the ES.		
	•Evidence of a forest management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
2.3.2 Other Forest Residues (to use as biofuel, firewood, etc)	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential	•Native species should be favoured (adapted to local conditions and maintenance of genetic diversity); •Management and monitoring of forest residues removal (e.g. quantities and impact of forest residues removal); •Management of production and price oscillation, knowledge of market channels (if applicable).	FSC 5.5 PEFC B.3
	•Forest residues left in field to promote soil protection – Y or N?	Benefit Variable: Balancing forest residues left in field to soil protection accounts for a +1 benefit in the ES end value..		
	•Impact of forest residues removal on site (impact assessment records).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Native species favoured – Y or N?	Benefit Variable: Favouring of native species accounts for a +1 benefit in the ES end value.		
	•Existence of identifiable market channels and economic profit associated.	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit and 5 a very high profit (or virtually inexistent).		
2.3.3 Cork	•Present - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local forestry and cork laws and administrative requirements (e.g. harvesting cycles); •Adoption of forest management guidelines considering plantation maintenance and adapted to local or regional conditions; •Type of policy and management on cork harvest (private versus public) and forest management plan, regarding the promotion and maintenance of cork value (e.g. production records, harvesting yield, growth rates, etc.); •Local or regional varieties should be favoured (adapted to local conditions and maintenance of genetic diversity);	FSC 5.6 FSC 6.3 PEFC B.1.2 PEFC B.1.3 PEFC B.3
	•Evidence of compliance with national and local forestry laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of a forest management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Forest management adapted to local or regional conditions – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.		
	•Harvesting and managing impact on harvesting sites and related habitats.	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	•Management and monitoring of cork production, actions taken to maintain and increase production (e.g. product quality and impact of harvesting).	
	•Conservation state of harvesting sites.	Point Variable: a 1 to 5 score is applicable, 1 being a very low iconservation state and 5 a very high conservation state		
	•Local or regional varieties species favoured – Y or N?	Benefit Variable: Favouring of local or regional varieties accounts for a +1 benefit in the ES end value.		
	•Evidence of actions taken towards conservation and improvement, regarding genetic and habitat diversity – Y or N?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Economic profit.	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.		
	•Present - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.		
	•Evidence of compliance with national and local forestry laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of the end value of the ES.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
2.3.4 Cones, resins, etc	•Evidence of a forest management plan – Y or N?	Penalty Variable: No compliance has a penalty of the end value of the ES.	•Compliance with national and local forestry laws and administrative requirements (e.g. harvesting techniques); •Adoption of forest management guidelines considering plantation maintenance and adapted to local or regional conditions; •Type of policy and management on cork harvest (private versus public) and forest management plan, regarding the promotion and maintenance of cork value (e.g. production records, harvesting yield, growth rates, etc.); •Native species should be favoured (adapted to local conditions and maintenance of genetic diversity); •Management and monitoring of forest products availability, actions taken to maintain and increase production (e.g. product quality and impact of harvesting). •Management of production and price oscillation, knowledge of market channels (if applicable).	FSC 5.6 FSC 6.3 PEFC B.1.2 PEFC B.1.3 PEFC B.3
	•Forest management adapted to local or regional conditions – Y or N?	Penalty Variable: No compliance has a penalty of the end value of the ES.		
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential..		
	•Harvesting and managing impact on harvesting sites and related habitats.	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Native species favoured – Y or N?	Benefit Variable: Favouring of native species accounts for a +1 benefit in the ES end value.		
	•Diversity of other forest products.	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very low diversity and 5 to a very high diversity.		
	•Evidence of actions taken towards conservation and improvement, regarding genetic and habitat diversity – Y or N?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Existence of identifiable market channels and economic profit associated.	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.		
	2.4 Plant and Animal Resources			
2.4.1 Genetic Resources (potencial)	•Site potential for genetic resources	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	•Local or regional breeds should be favoured (adapted to local conditions and maintenance of genetic diversity); •Conservation of plant and animals genetic resources for food and agriculture should be taken (e.g. food security) •Monitoring of genetic resources should be promoted (occurrence of landraces, population diversity of landraces, spreading of modern varieties; population size, number and physical localization, interpopulation genetic structure) •Relative areas sown to different cultivars and extent of genetic relatedness between these cultivars should be considered (e.g. genetic erosion) •Should be created a internet based system to collate, store and access information on animal and plant genetic resources •Research activities should be promoted •Should be incentivised partner ships between communities, governments, companies and research agencies setting up and running the process and sharing information	FSC 5.6 FSC 6.3 PEFC B.1.2 PEFC B.1.3 PEFC B.3
	•Local or regional breeds favoured – Y or N?	Benefit Variable: Favoring of local or regional breeds accounts for a +1 benefit in the ES end value		
	•Evidence of a conservation action plan for genetic resources – Y or N?	Benefit Variable: Evidence of a conservation action plan for genetic resources accounts for a +1 benefit in the ES end value.		
	•Evidence of genetic resources populations monitoring – Y or N?	Benefit Variable: Existence of monitoring evidence accounts for a +1 benefit in the ES end value.		
	•Evidence of genetic relatedness studies – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.		
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.		
	•Existence of research activities– Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
	•Evidence of partnerships to share and improve the sharing of information – Y or N?	Benefit Variable: Existence of partnerships evidence accounts for a +1 benefit in the ES end value.		
	•Impact on genetic resources (n. º of species, population size).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
2.4.2 Medicinal species and with interest for the cosmetic industry (potencial)	•Site potential for medicinal plants	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	•Should be incentivised the protection of the medicinal plants occurrence instead of harvesting them. •Should be promoted a market for medicinal plants. •Monitoring of medicinal plants should be promoted(population size, number and physical localization) •A resource mapping must be done. •Research activities should be promoted. •Management of production and price oscillation, knowledge of market channels.	
	•Impact on genetic resources (n. º of species, population size)	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent)		
	•Evidence of non-harvesting medicinal plants	Benefit Variable: Existence of partnerships evidence accounts for a +1 benefit in the ES end value.		
	•Evidence of a medicinal plant management plan – Y or N?	Benefit Variable: Existence of evidence accounts for a +1 benefit in the ES end value.		
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of mapping assessments evidence accounts for a +1 benefit in the ES end value.		
	•Existence of research activities– Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
	3. Regulating 3.1 Cycles			
	•Evidence of erosion/problematic areas - Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Use of appropriate preventive measures, based on the principle of soil management, that should minimize raindrop impacts, enhance and maintain favorable soil structure, minimize surface crust, favor a high infiltration rate, and reduce runoff rate and amount (e.g. cover crops/ vegetation for continuous ground cover, organic residue mulch for bare soil areas or recently harvested with reduction in runoff and soil erosion, conservation tillage, etc.); •Management plan (could be a part of the Forest Management Plan) addressing problematic areas, identifiable on the field, incorporating specific preventive measures for each area followed by implementation and monitoring.	
	•Evidence of planning and actions taken to address soil retention, formation and erosion control – Y or N?	Benefit Variable: Evidence of planning and actions taken to address soil retention, formation and erosion control accounts for a +1 benefit in the ES end value.		
	•Impact of property activities in soil retention, formation and erosion control - Low or high impact?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Is conservation tillage in practice – Y or N?	Benefit Variable: Evidence of conservation tillage in practice accounts for a +1 benefit in the ES end value.		
	•Adequacy of plant structures (or organic residue mulch) to address erosion control, soil retention and formation.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
3.1.2 Water Regulation*	•Evidence of compliance with national and local water use laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Compliance with national and local watershed management laws and guidelines; •Fresh water management plan regarding efficient hydrologic regulation. Water quality should be regularly tested and consumption should not exceed capacity, maintaining the ecological flow and allowing for water flow/use further downstream. Infiltration/ retention areas should be in place by maintaining efficient soil structure and/or plant communities, using ecological and hydrological processes. Stream flow should not have any blockages allowing for correct stream flow (e.g. irrigation operations should be improved so as to restore in-stream flows); •Appropriate conservation practices meant to prevent or reduce the amount of pollution/ degradation generated by property activities, in order to protect and enhance water quality should be in place (e.g. enhancing natural processes of nutrient retention to avoid harmful algal blooms);	FSC 5.5 FSC 6.5 FSC 10.6 PEFC 4.2.1 PEFC B.5.1
	•Water quality – Low or high quality?	Point Variable: a 1 to 5 score is applicable, 1 being a very low quality and 5 a very high quality.		
	•Existence of superficial water retention accounting for ecological and natural in-stream flows – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of measures to prevent or reduce fresh water contamination/degradation – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Adequacy of plant structures to promote water infiltration and aquifer recharge.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Adequacy of soil type/soil condition to allow water infiltration and aquifer recharge where necessary.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Impacts of fresh water consumption downstream – Low or high impact?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
	•PRESENCE OF BUFFER PROTECTION AREAS – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•A BUFFER AREA DEDICATED TO WATERSHED PROTECTION SHOULD BE IN PLACE (E.G. PRESENCE OF MARGINAL RIPARIAN VEGETATION REPRESENTING NO TILLAGE AND NO PRODUCTION AREA AROUND WATER BODIES), PROTECTING AND ENHANCING INTEGRITY OF AQUATIC ECOSYSTEMS AND ASSOCIATED SPECIES IN THE FACE OF HUMAN-MEDIATED ALTERATIONS.	
	•CONSERVATION STATE OF PLANT COMMUNITIES AND RELATED AQUATIC HABITATS.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CONSERVATION STATE AND 5 A VERY HIGH CONSERVATION STATE (OR VIRTUALLY INEXISTENT).		
3.1.3 NUTRIENT REGULATIONS *	•EVIDENCE OF SOIL FERTILITY, VEGETATION AND FOLIAR VITALITY ASSESSMENT AND MONITORING – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF ASSESSMENT AND/OR MONITORING ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	•MANAGEMENT PLAN (COULD BE A PART OF THE FOREST MANAGEMENT PLAN) REGARDING FERTILIZERS APPLICATION POLICY AND/OR OTHER MEASURES TO PROMOTE NUTRIENT CYCLES; •ASSESSMENT AND MONITORING OF SOIL FERTILITY, VEGETATION AND FOLIAR VITALITY; •SOIL CONSERVATION PLAN FOCUSED ON BENEFICIAL FLORA, FUNGUS AND SOIL FAUNA PROMOTION FOCUSED ON NUTRIENT FIXATION, STORAGE AND RECYCLING.	FSC 6.3 PEFC B.2.2
	•EVIDENCE OF MANAGEMENT PLAN – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF MANAGEMENT PLAN ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF SOIL CONSERVATION PLAN – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF SOIL CONSERVATION PLAN ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•ADEQUACY OF SOIL TYPE/SOIL CONDITION TO ALLOW NUTRIENT REGULATION.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW ADEQUACY AND 5 A VERY HIGH ADEQUACY.		
	•ADEQUACY OF PLANT STRUCTURES AND SOIL BIOTA TO PROMOTE NUTRIENT REGULATION.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW ADEQUACY AND 5 A VERY HIGH ADEQUACY.		
3.1.4 POLLINATION	•EVIDENCE OF PLANT SPECIES, COMMUNITIES AND/OR HABITAT (ESPECIALLY RELEVANT FOR SPECIES ATTRACTIVE TO POLLINATORS) ASSESSMENT AND MONITORING – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF ASSESSMENT AND/OR MONITORING ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	•ASSESSMENT AND MONITORING OF PLANT SPECIES AND COMMUNITIES COMPRISING EXISTENT HABITATS WITH IMPORTANCE TO POLLINATOR ATTRACTION/DEPENDENCE (E.G. MAPPING OF DISTRIBUTION AREAS AND CONSERVATION STATE, ETC.); •ASSESSMENT AND MONITORING THE STATUS AND TRENDS OF POLLINATOR DIVERSITY AND POPULATIONS WITHIN THE PROPERTY; •PROMOTION OF POLLINATOR-FRIENDLY PRACTICES (E.G. ESTABLISHMENT OF POLLEN AND NECTAR SPECIES RICH AREAS, INCREASING BOTANICAL DIVERSITY WITH ADAPTED NATIVE PLANTS, AVOIDING/MINIMIZING PESTICIDE AND INSECTICIDE USE, ETC.) AND ASSESSMENT OF THREATS TO POLLINATORS AND POLLINATION SERVICES.	FSC 5.5 PEFC B.3
	•EVIDENCE OF POLLINATOR DIVERSITY AND POPULATIONS TREND AND STATUS ASSESSMENT AND MONITORING – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF ASSESSMENT AND/OR MONITORING ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF PROMOTION OF POLLINATOR-FRIENDLY PRACTICES AND ASSESSMENT OF THREATS – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF ASSESSMENT AND/OR MONITORING ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•IMPORTANCE OF SOIL USE IN TERMS OF POLLEN AND NECTAR SPECIES RICHNESS (PATCH CONNECTIVITY AND EXTENT SHOULD BE TAKEN INTO ACCOUNT).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW IMPORTANCE AND 5 A VERY HIGH IMPORTANCE.		
3.1.5 LOCAL CLIMATE REGULATION* (CARBON)	•IS IT AN AREA OF FAST RECONVERSION – Y OR N?	PENALTY VARIABLE: NO CO MPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•FARM OR FOREST MANAGEMENT PLAN STATING MANAGEMENT ACTIONS FOR EACH LANDUSE, REGISTRATION OF DOMINANT PLANT SPECIES AND RESPECTIVE DENSITY. FOR WOODLANDS AND TREE PLANTATIONS THE DESCRIPTION OF THE UNDERSTORY IS ALSO IMPORTANT AS IS THE LONGEVITY OF PLANTATIONS (E.G. EUCALYPTUS ARE HARVESTED IN AVERAGE EVERY 11 YEARS, MARITIME PINE EVERY 80 YEARS); •KNOWLEDGE OF SEQUESTRATION RATES FOR THE DOMINANT SPECIES/ COMMUNITIES/LANDUSES (APPLIES TO WATER BODIES) WITHIN THE PROPERTY.	N/A
	•IS THE AREA MANAGED FOR TIMBER EXTRACTION –Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•CAPACITY OF CARBON SINK CAPACITY OF THE DOMINANT SPECIES/COMMUNITY/LANDUSE (APPLIES TO WATER BODIES).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CAPACITY AND 5 A VERY HIGH CAPACITY.		
	•CAPACITY OF VEGETATION COVER IN THE UNDERSTORY (WOODLANDS AND TREE PLANTATIONS) TO ACT AS CARBON SINKS.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CAPACITY AND 5 A VERY HIGH CAPACITY.		
	•AMOUNT OF CARBON STORED IN TREES OR BUSHES AND AS ORGANIC MATTER IN THE SOIL.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CAPACITY AND 5 A VERY HIGH CAPACITY.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
	3.2 Depuration			
3.2.1 Soil Bioremediation	•Evidence of a soil management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Soil management plan identifying areas with soil bioremediation capacity and needs, additional remediation techniques, •Assessment and monitoring of soil contamination and bioremediation capacity; •Purification structures should be in place (e.g. sediment and plant communities acting as natural pollutants/excess nutrients filters and retention sinks). •Measures should be planned to maintain soil and all other elements integrity; •Soil conservation plan focused on beneficial soil biota bioremediation capacity.	N/A
	•Evidence of measures to maintain soil and other elements integrity – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of soil contamination and bioremediation capacity assessment and monitoring – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Capacity of existent soil and soil biota to act as natural filters and retention sinks.	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.		
	•Evidence of soil conservation plan – Y or N?	Benefit Variable: Evidence of soil conservation plan accounts for a +1 benefit in the ES end value.		
3.2.2 Residues/pollutants treatment	•Evidence of compliance with national and local residues/pollutants treatment laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Compliance with national and local residues/pollutants treatment laws and guidelines; •Residues/pollutants management plan regarding pollutants/ excess nutrients discharge reduction and elimination (i.e. pesticide and related agro-chemicals minimal use is advisable by metering applications to established problems, localized applications). A good irrigation management is also advisable and should be a part of the farm management plan as it maximizes pesticide effectiveness and minimizes offsite movement; •Preventive measures should be taken to avoid water, including ground water, and soil contamination, defining mitigation actions in case of an accident as well as defining a strict policy for storage. A risk assessment (when and where appropriate) should be carried out; •Purification structures should be in place (e.g. sediment and plant communities acting as natural pollutants/excess nutrients filters and retention sinks). Soil (relating to rainfall infiltration and aquifer recharge), aquatic biota and plant communities play an important role in the purification process, actions should be taken to maintain their integrity; •A buffer area dedicated to water resources protection should be in place (e.g. presence of marginal riparian vegetation representing no tillage and no production area), protecting freshwater associated species as well.	N/A
	•Evidence of evidence of a residues/pollutants management plan accounting for minimal use (good be a part of the forest or farm management plan) – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of measures to prevent, reduce and eliminate water and soil contamination/ degradation – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of an efficient irrigation management – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of mitigation actions definition, risk assessment and risk analysis (when and where appropriate) – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES (when and where appropriate).		
	•Capacity of existent plant communities to act as natural pollutants/excess nutrients filters and retention sinks.	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.		
	•Capacity of residues/pollutants treatment through sediment filtration (according to sediment type).	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.		
	•Evidence of management actions taken to maintain soil and water biota integrity – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Presence of buffer protection areas – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
3.2.3 WATER PURIFICATION	•EVIDENCE OF COMPLIANCE WITH NATIONAL AND LOCAL WATER TREATMENT LAWS AND GUIDELINES – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•COMPLIANCE WITH NATIONAL AND LOCAL WATER TREATMENT LAWS AND GUIDELINES; •FRESH WATER MANAGEMENT PLAN REGARDING WATER TREATMENT AND POLLUTANTS/ EXCESS NUTRIENTS DISCHARGE REDUCTION. WATER QUALITY SHOULD BE REGULARLY TESTED. PURIFICATION STRUCTURES SHOULD BE IN PLACE (E.G. SEDIMENT AND PLANT COMMUNITIES ACTING AS NATURAL POLLUTANTS/EXCESS NUTRIENTS FILTERS AND RETENTION SINKS). SOIL (RELATING TO RAINFALL INFILTRATION AND AQUIFER RECHARGE) AND AQUATIC BIOTA PLAY AN IMPORTANT ROLE IN THE PURIFICATION PROCESS, ACTIONS SHOULD BE TAKEN TO MAINTAIN THEIR INTEGRITY; •ADEQUATE WATER TREATMENT TECHNOLOGIES SHOULD BE INTRODUCED WHEN APPROPRIATE; •APPROPRIATE CONSERVATION PRACTICES MEANT TO PREVENT OR REDUCE THE AMOUNT OF POLLUTION/ DEGRADATION GENERATED BY PROPERTY ACTIVITIES, IN ORDER TO PROTECT AND ENHANCE WATER QUALITY, LOCALLY AND TO PREVENT DOWNSTREAM CONTAMINATION, SHOULD BE IN PLACE (E.G. ENHANCING NATURAL PROCESSES OF NUTRIENT RETENTION TO AVOID HARMFUL ALGAL BLOOMS); •A BUFFER AREA DEDICATED TO WATERSHED PROTECTION SHOULD BE IN PLACE (E.G. PRESENCE OF MARGINAL RIPARIAN VEGETATION AND AQUATIC VEGETATION ALLOWING FOR POLLUTANT RETENTION AND RECYCLE), PROTECTING AND ENHANCING INTEGRITY OF AQUATIC ECOSYSTEMS AND ASSOCIATED SPECIES IN THE FACE OF HUMAN-MEDIATED ALTERATIONS.	FSC 5.5 PEFC 4.2.1 PEFC B.5.1
	•WATER QUALITY – LOW OR HIGH QUALITY?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW QUALITY AND 5 A VERY HIGH QUALITY.		
	•EVIDENCE OF MEASURES TO PREVENT OR REDUCE FRESH WATER CONTAMINATION/DEGRADATION – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•CAPACITY OF EXISTENT PLANT COMMUNITIES TO ACT AS NATURAL POLLUTANTS/EXCESS NUTRIENTS FILTERS AND RETENTION SINKS.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CAPACITY AND 5 A VERY HIGH CAPACITY.		
	•CAPACITY OF WATER PURIFICATION THROUGH SEDIMENT INFILTRATION (ACCORDING TO SEDIMENT TYPE).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CAPACITY AND 5 A VERY HIGH CAPACITY.		
	•EVIDENCE OF MANAGEMENT ACTIONS TAKEN TO MAINTAIN SOIL AND WATER BIOTA INTEGRITY – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•PRESENCE OF BUFFER PROTECTION AREAS – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•IS THERE A WASTEWATER TREATMENT (WHERE APPROPRIATE) – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES. (ONLY APPLIED IF THE REFERRED WASTEWATER TREATMENT IS REQUIRED)		
3.2.4 AIR QUALITY*	•AIR QUALITY – LOW OR HIGH QUALITY?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW QUALITY AND 5 A VERY HIGH QUALITY.	•ASSESS AND MINIMIZE ALL POSSIBLE AIR QUALITY DISTURBANCES ARISING FROM THE PROPERTY ACTIVITY AND MANAGEMENT; •ASSESS VEGETATION COVER AND ITS POTENTIAL CONTRIBUTION TO AIR PURIFICATION AND QUALITY (THIS CONTRIBUTION IS MAINLY AT THE COMMUNITY LEVEL).	N/A
	•IMPACT OF PROPERTY ACTIVITY AND MANAGEMENT IN AIR QUALITY – LOW OR HIGH IMPACT?	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•CONTRIBUTIONS OF VEGETATION COVER (MAIN SPECIES COMPOSITION, DENSITY, ETC.) TO AIR PURIFICATION AND QUALITY.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CONTRIBUTION AND 5 A VERY HIGH CONTRIBUTION.		
3.3 PREVENTION				
3.3.1 FLOOD BUFFER ZONES	•PRESENT - Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•COMPLIANCE WITH NATIONAL AND LOCAL FLOOD BUFFER ZONES LAWS AND ADMINISTRATIVE REQUIREMENTS (E.G. NATIONAL ECOLOGICAL RESERVE); •LAND USE MANAGEMENT PLAN REGARDING EFFICIENT FLOOD PREVENTION. INFILTRATION/RETENTION AREAS SHOULD BE IN PLACE BY MAINTAINING EFFICIENT SOIL STRUCTURE AND/OR PLANT COMMUNITIES, USING ECOLOGICAL AND HYDROLOGICAL PROCESSES. FRESH WATER FLOW SHOULD NOT HAVE ANY BLOCKAGES PREVENTING OVERFLOWS; •AN AREA DEDICATED TO WATER INFILTRATION SHOULD BE IN PLACE AND PROPERLY CONSERVED, HAVING VEGETATION THAT HELPS TO REDUCE WATER VELOCITY AND INCREASE INFILTRATION.	FSC 5.5 FSC 6.5 FSC 10.6 PEFC 4.2.1 PEFC B.5.1
	•EVIDENCE OF COMPLIANCE WITH NATIONAL AND LOCAL FLOOD BUFFER ZONES LAWS AND GUIDELINES – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF A LAND USE MANAGEMENT PLAN – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF ACTIONS TAKEN TOWARDS CONSERVATION AND IMPROVEMENT OF FLOOD BUFFER ZONES – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
	•Adequacy of soil type/soil condition to allow water infiltration where necessary.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Adequacy of plant structures to promote water infiltration.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
3.3.2 Fire prevention/control	•Evidence of compliance with national and local flood fire prevention laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Compliance with national and local fire prevention laws and administrative requirements; •Fire prevention plan (could be a part of the Forest Management Plan) regarding water points access, divisional network and spontaneous vegetation control. Having a good prevention plan will decrease the need of control actions and production losses. •Evaluation and monitoring fire risk in order to effectively plan fire prevention/control needs.	FSC 10.7 PEFC B.2.1
	•Evidence of a fire prevention plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of actions taken towards conservation and improvement of fire prevention zones – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evaluation of fire risk – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Adequacy of land use mosaic to promote fire resistance where necessary.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Adequacy of vegetation structure to promote fire resistance.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
3.3.3 Pest and disease prevention	•Evidence of compliance with national and local pest and disease prevention laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Compliance with national and local pest and disease prevention laws and administrative requirements; •Pest and disease prevention plan (could be a part of the Forest Management Plan) regarding chemical usage policy, attack level, contamination prevention measures, etc; •Monitoring the status and trends of pest and disease within the property and neighbor properties.	FSC 6.8 FSC 10.7 PEFC B.2.3
	•Evidence of a pest and disease prevention plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of actions taken towards pest and disease prevention – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Adequacy of vegetation structure and diversity to prevent pest and disease dispersal.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Adequacy of plantation density to prevent pest and disease dispersal.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
	•Presence of invasive exotic species - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.		
	•Evidence of a invasive exotic species control plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
3.3.4 Exotic species control	•Evidence of actions taken towards invasive exotic species control – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	•Invasive exotic species control plan (could be a part of the Forest Management Plan) regarding chemical usage policy, species control measures, etc; •Monitoring the status and trends of invasive exotic species within the property and neighbor properties;	FSC 6.9
	•Adequacy of vegetation structure and diversity to prevent invasive exotic species development.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
3.3.5 Grazing fields control	•Presence - Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Compliance with national and local livestock production laws and guidelines; • Grazing management plan, regarding the promotion and maintenance of grazing, animal density and rotation; • Monitoring the efficiency on fire prevention and fire risk decrease.	N/A
	•Evidence of compliance with national and local livestock production laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of a grazing management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.		
	•Adequacy of vegetation structure and diversity to promote grazing fields control.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.		
3.4 Habitat functions				
3.4.1 Habitats Maintenance*	•Evidence of a conservation action plan for habitats – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES	•Developing a conservation strategy to the habitats •Identify the conservation priority on the site based on habitats importance •Maintenance and improvement of habitats ecosystem productive capacity •Developing site-specific condition indicators (key species) •Storing monitoring data in a GIS •Compliance with national and local FSC laws and administrative requirements; •Should be done tests on habitat health and vitality (e.g. plant health of forest stands) •Maintenance of forest contribution to global carbon cycles •The successional stage of the plant communities should be taken into account in order to promote habitats natural evolution in a long term scale •Must be taken conservation measures if competition from exotic species occur • Should be encourage best practice codes for habitats maintenance •Habitats management should consider the conservation of special environmental, cultural, social and/or scientific values •Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators •It's necessary to measure diversity for organisms such as bacteria, macro and micro-arthropods, nematodes, microbial biomass, soil enzymes and respiration	FSC 6.2 FSC 6.3 FSC 6.4 FSC 9.1 PEFC B.4
	•State of habitats conservation	Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state.		
	•Evidence of a monitoring plan for habitats evolution – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of management actions taken to conserve and maintain habitats structure and functions – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES		
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
	•Evidence of compliance with national and local laws in respect to FSC – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Best practices codes for habitats are been taking into account – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Are diversity measures been taken for bacteria, macro and microarthropods, nematodes, microbial biomass, soil enzymes and respiration – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value		

EGC	Variables/Indicators	Score and Criteria	Management Needs	FSC and PEFC Criteria
3.4.2 High Conservation Value Areas (HCVA) and the existence of critically endangered (CR) and endangered (EN) habitats and species	•Evidence of a conservation action plan for HCVA (it could be a part of a broader plan, if applicable) – Y or N? •State of habitats conservation •Evidence of a buffer zone for HCVA – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state. Penalty Variable: No compliance has a penalty of -1 in the end value of the ES	•Developing a buffer zone for HCVA •Identify the conservation priority on the HCVA based on habitats functions •Maintenance and improvement of HCVA •Developing site-specific condition indicators based on the existence of CR and EN species •Storing monitoring data in a GIS •Compliance with national and local FSC laws and adminis-trative requirements; •The successional stage of the plant communities should be taken into account in order to promote habitats natural evolution in a long term scale •Must be taken conservation measures if competition from exotic species occur •Should be encourage best practice codes for habitats maintenance •Habitats management should consider the conservation of special environmental, cultural, social and/or scientific values •Availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators •Conservation in situ and ex situ of EN/CR species should been done	
	•Evidence of a monitoring plan for HCVA and EN/CR species evolution – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of management actions taken to conserve and maintain HCVA and EN/CR species – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES		
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
	•Evidence of compliance with national and local laws in respect to FSC – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
	•Evidence of conservation ex situ and in situ of EN/CR species – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
	•Best practices codes for HCVA are been taking into account – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		
3.4.3 Biodiversity Bank functions	•Capacity of the area to function as a biodiversity bank	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.	•Create a Biodiversity bank with seed plants from the HCVA (e.g. conservation ex situ) •Facilitate the process of "offsetting" impacts on Bio-diversity as part of the development consent process •Create a methodology to quantify 'offsets' (e.g. holders of land with significant conservation value could generate offset credits that may be onsold to a proponent of a development in an area that may have a negative impact on biodiversity) •The threatened species must be protected through conservation measures	FSC 6.2 FSC 6.3 FSC 9.1 PEFC B.4
	•Is management of the area designed to improve biodiversity bank functions? – Y or N	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.		
4. Cultural				
4.1 Human Well-Being				
4.1.1 Recreation Activities (potential)	•Existence of recreation activities – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	•Evidence of a load capacity program (visitors number, frequency, load) •Adapting recreation activities to species and habitat life cycle should consider the reproductive periods of individual game species, while avoiding impact on non-game species, specially endangered species (e.g. avoiding the presence of persons in reproductive areas); •Management of production and price oscillation, knowledge of market channels. •A management plan should be taken to recreation activities, showing the impacts of these activities on Biodiversity, soil, water (assessment of impact activities)	FSC 4.8 FSC 6.5 FSC 9.1 FSC 10.5 FSC 10.6
	•Site potential for recreation activities	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.		
	•Impact of recreation activities on site (visitors records: n. º of visitor days and number of visitors in a given day, etc.).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).		
	•Economic profit	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.		
	•Existence of a load capacity program – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.		

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
	•THE RECREATION ACTIVITIES RESPECT THE FEEDING AND REPRODUCTION PERIODS– Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EXISTENCE OF IDENTIFIABLE MARKET CHANNELS AND ECONOMIC PROFIT ASSOCIATED.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•EVIDENCE OF A RECREATION ACTIVITIES MANAGEMENT PLAN – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
4.1.2 TOURISM/ECO-TOURISMO (POTENTIAL FOR THE LANDOWNER)	•EXISTENCE OF TOURISM ECOTOURISM ACTIVITIES (IT COULD REFER TO INFORMAL AND SPORADIC ACTIVITIES) – Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•EVIDENCE OF A LOAD CAPACITY PROGRAM (VISITORS NUMBER, FREQUENCY, LOAD) •ADAPTING TOURISM AND ECOTOURISM ACTIVITIES TO SPECIES AND HABITAT LIFE CYCLE SHOULD CONSIDER THE REPRODUCTIVE PERIODS OF INDIVIDUAL GAME SPECIES, WHILE AVOIDING IMPACT ON NON-GAME SPECIES, SPECIALLY ENDANGERED SPECIES (E.G. AVOIDING THE PRESENCE OF PERSONS IN REPRODUCTIVE AREAS); •MANAGEMENT OF PRODUCTION AND PRICE OSCILLATION, KNOWLEDGE OF MARKET CHANNELS. •A MANAGEMENT PLAN SHOULD BE TAKEN TO TOURISM AND ECOTOURISM ACTIVITIES, SHOWING THE IMPACTS OF THESE ACTIVITIES ON BIODIVERSITY, SOIL, WATER (ASSESSMENT OF IMPACT ACTIVITIES) •A TOURISM AND ECOTOURISM MONITORING PLAN MUST BE DONE •THERE MUST BE GOOD INFRA-STRUCTURES ATTACHED TO THE TOURISM AND ECOTOURISM ACTIVITIES •A BIODIVERSITY ACTION PLAN MUST BE DONE (FLORA, VEGETATION, HABITATS, FAUNA)	FSC 4.8 FSC 6.5 FSC 9.1 FSC 10.5 FSC 10.6
	•SITE POTENTIAL FOR ECOTOURISM ACTIVITIES	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL.		
	•IMPACT OF ECOTOURISM ACTIVITIES ON SITE (VISITORS RECORDS: N. º OF VISITOR DAYS AND NUMBER OF VISITORS IN A GIVEN DAY, ETC.).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).		
	•EXISTENCE OF A LOAD CAPACITY PROGRAM (IF NECESSARY, WHEN THERE IS WELL ESTABLISHED PROGRAM WITH A HIGH VISIT/ACTIVITY RATE) – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•THE RECREATION ACTIVITIES RESPECT THE FEEDING AND REPRODUCTION PERIODS – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF A TOURISM AND ECOTOURISM MANAGEMENT PLAN – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		
	•EVIDENCE OF A TOURISM AND ECOTOURISM MONITORING PLAN – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.		FSC 6.2 FSC 6.3 FSC 6.4 FSC 9.1 PEFC B.4
	•EVIDENCE OF A BIODIVERSITY ACTION PLAN – Y OR N?	BENEFIT VARIABLE: EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF GOOD INFRA-STRUCTURES	BENEFIT VARIABLE: EXISTENCE OF MAPPING ASSESSMENTS EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EXISTENCE OF IDENTIFIABLE MARKET CHANNELS AND ECONOMIC PROFIT ASSOCIATED (IF APPLICABLE, E.G. WHENEVER THE LANDOWNER POSSESSES AN ECONOMIC PROFIT WITH THE ACTIVITY).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW PROFIT (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH PROFIT.		
4.1.3 LANDSCAPE	•EVIDENCE OF CONSERVATION ACTIONS TAKEN THAT PRESERVE AND IMPROVE LANDSCAPE CONSERVATION STATE AND SCENIC BEAUTY – Y OR N?	PENALTY VARIABLE: NO COMPLIANCE HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	•MEASURES SHOULD BE TAKEN IN ORDER TO ENHANCE THE LANDSCAPE STATE OF CONSERVATION (E.G. ECOLOGICAL CORRIDORS IMPROVEMENT) •HUMAN PRESSURES SHOULD BE MINIMIZED IN ORDER TO ENHANCE THE COMMUNITY PERCEPTION OF THE LANDSCAPE •THE LANDSCAPE FUNCTIONS MUST BE IMPROVED (E.G. RECREATION, CULTURAL IDENTITY, TRANQUILLITY)	FSC 4.8 FSC 9.1
	•CONTRIBUTION OF LANDUSE TO OVERALL CONSERVATION AND APPEAL LEVEL OF THE LANDSCAPE.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CONTRIBUTION (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH CONTRIBUTION.		

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	MANAGEMENT NEEDS	FSC AND PEFC CRITERIA
4.2 EDUCATIONAL				
4.2.1 EDUCATION/INTERPRETATION	•SITE POTENTIAL FOR EDUCATIONAL ACTIVITIES	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL.	•THERE MUST BE GOOD INFRA-STRUCTURES, EQUIPMENT AND MATERIALS THAT ASSURE THE EDUCATIONAL PROCESS •SHOULD BE INCENTIVISED PARTNERSHIPS BETWEEN COMMUNITIES, GOVERNMENTS, COMPANIES AND RESEARCH AGENCIES SETTING UP AND RUNNING THE PROCESS AND SHARING INFORMATION	FSC 4.8 FSC 9.1
	•EVIDENCE OF GOOD INFRA-STRUCTURES	BENEFIT VARIABLE: EXISTENCE OF MAPPING ASSESSMENTS EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF GOOD RELATIONSHIPS BETWEEN PARTNERS	BENEFIT VARIABLE: EXISTENCE OF MAPPING ASSESSMENTS EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
4.2.2 SCIENTIFIC RESEARCH/ ECOLOGICAL KNOWLEDGE	•EXISTENCE OF SCIENTIFIC RESEARCH ACTIVITIES – Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	•THERE MUST BE GOOD INFRA-STRUCTURES, EQUIPMENT AND MATERIALS THAT ASSURE THE SCIENTIFIC INVESTIGATION SUCCESS •SHOULD BE INCENTIVISED PARTNERSHIPS BETWEEN COMMUNITIES, GOVERNMENTS, COMPANIES AND RESEARCH AGENCIES SETTING UP AND RUNNING THE PROCESS AND SHARING INFORMATION •RESULTS FROM THE SCIENTIFIC RESEARCHERS MUST BE PUT IN TO PRACTICE BY PRACTICAL PROJECTS	FSC 4.8 FSC 9.1
	•SITE POTENTIAL FOR SCIENTIFIC RESEARCH ACTIVITIES/ECOLOGICAL KNOWLEDGE	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL.		
	•EVIDENCE OF GOOD INFRA-STRUCTURES	BENEFIT VARIABLE: EXISTENCE OF EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF GOOD RELATIONSHIPS BETWEEN PARTNERS TAKING PART IN SCIENTIFIC RESEARCH ACTIVITIES	BENEFIT VARIABLE: EXISTENCE OF EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		
	•EVIDENCE OF RESULTS FROM SCIENTIFIC RESEARCH ACTIVITIES AND ECOLOGICAL KNOWLEDGE	BENEFIT VARIABLE: EXISTENCE OF MAPPING ASSESSMENTS EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.		

TABLE 12
Application of the framework for rural properties evaluation to the case study, evaluation by landuse. A result of 0 accounts for either a private good or a result of a critical failure variable. When the land use does not provide a given ES no entry is shown (-).

EGC	VARIABLES/INDICATORS	SCORE AND CRITERIA	CORK OAK MONTADO	MIX WOODLAND	EUCALYPTUS PLANTATION	IRRIGATED PASTURE	MARITIME PINE PLANTATION	MEADOW PIVOT IRRIGATION	RIPARIAN GALLERY	SOCIAL AREA	STONE PINE WOODLAND	WATER BODIES
2. Provisioning												
2.1 Food												
HARVESTING (POTENTIAL FOR	•EXISTENCE OF NATURAL FOOD HARVESTING – Y OR N?	CRITICAL FAILURE VARIABLE: IF THE ANSWER IS NO THE END VALUE FOR THE ES IS 0.	Y	Y	-	Y	-	Y	-	Y	-	Y	Y
	•EXISTENCE OF CONFLICTS WITH THE LOCAL POPULATION ARISING FROM NATURAL FOOD HARVESTING – Y OR N?	PENALTY VARIABLE: EXISTENCE OF CONFLICTS HAS A PENALTY OF -1 IN THE END VALUE OF THE ES.	N	N	-	N	-	N	-	N	-	N	N
	•SITE POTENTIAL.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL.	4	4	-	2	-	2	-	5	-	3	2
	•CONSERVATION STATE OF HARVESTING SITES.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW CONSERVATION STATE AND 5 A VERY HIGH CONSERVATION STATE.	4	4	-	3	-	3	-	5	-	2	3
	•DIVERSITY OF NATURAL FOODS.	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 CORRESPONDING TO VERY LOW DIVERSITY AND 5 TO A VERY HIGH DIVERSITY.	4	4		2		2		5		2	2
	•EVIDENCE OF MAINTENANCE OR INCREASE IN STOCKS AND/OR QUALITY.	BENEFIT VARIABLE: EVIDENCE OF MAINTENANCE OR INCREASE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	No Evidence
	•HARVESTING IMPACT ON NATURAL FOOD STOCKS AND QUALITY (1 TO 5 – INVERSE OF THE PREVIOUS).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).	4	4	-	4	-	4	-	5	-	4	4
	•HARVESTING IMPACT ON HARVESTING SITES AND RELATED HABITATS (1 TO 5 – INVERSE OF THE PREVIOUS).	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY HIGH IMPACT AND 5 A VERY LOW IMPACT (OR VIRTUALLY INEXISTENT).	4	4	-	4	-	4	-	5	-	4	4
	•EXISTENCE OF IDENTIFIABLE MARKET CHANNELS AND ECONOMIC PROFIT ASSOCIATED	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW PROFIT (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH PROFIT. IF HARVESTING IS EXCLUSIVELY PUBLIC THIS CRITERIA IS NOT ASSESSED.	Does not apply, not evaluated	Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated	Does not apply, not evaluated
END VALUE FOR ES			((4+4+4+4+4)/5)*1 = 4	((4+4+4+4+4)/5)*1 = 4		((2+3+2+4+4)/5)*1 = 3		((2+3+2+4+4)/5)*1 = 3		((5+5+5+5+5)/5)*1 = 5		((3+2+2+4+4)/5)*1 = 3	((2+3+2+4+4)/5)*1 = 3
2.4 Plant and Animal Resources													
2.4.1 GENETIC RESOURCES (POTENCIAL)	•SITE POTENTIAL FOR GENETIC RESOURCES	POINT VARIABLE: A 1 TO 5 SCORE IS APPLICABLE, 1 BEING A VERY LOW POTENTIAL (OR VIRTUALLY INEXISTENT) AND 5 A VERY HIGH POTENTIAL.	4	4	-	3	-	3	- 3	5	-	3	3
	•LOCAL OR REGIONAL BREEDS FAVOURED – Y OR N?	BENEFIT VARIABLE: FAVORING OF LOCAL OR REGIONAL BREEDS ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	+1	+1	-	+1	-	+1	N	N	-	+1	N
	•EVIDENCE OF A CONSERVATION ACTION PLAN FOR GENETIC RESOURCES – Y OR N?	BENEFIT VARIABLE: EVIDENCE OF A CONSERVATION ACTION PLAN FOR GENETIC RESOURCES ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•EVIDENCE OF GENETIC RESOURCES POPULATIONS MONITORING – Y OR N?	BENEFIT VARIABLE: EXISTENCE OF MONITORING EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•EVIDENCE OF GENETIC RELATEDNESS STUDIES – Y OR N?	BENEFIT VARIABLE: EXISTENCE OF GENETIC RESOURCES STUDIES EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•EXISTENCE OF A DATA BASED SYSTEM – Y OR N?	BENEFIT VARIABLE: EXISTENCE OF GENETIC RESOURCES STUDIES EVIDENCE ACCOUNTS FOR A +1 BENEFIT IN THE ES END VALUE.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
2. Provisioning 2.1 Food												
Harvesting (potential for	•Existence of natural food harvesting – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	Y	Y	-	Y	-	Y	-	Y	-	Y	Y
	•Existence of conflicts with the local population arising from natural food harvesting – Y or N?	Penalty Variable: Existence of conflicts has a penalty of -1 in the end value of the ES.	N	N	-	N	-	N	-	N	-	N	N
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	4	4	-	2	-	2	-	5	-	3	2
	•Conservation state of harvesting sites.	Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state.	4	4	-	3	-	3	-	5	-	2	3
	•Diversity of natural foods.	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very low diversity and 5 to a very high diversity.	4	4		2		2		5		2	2
	•Evidence of maintenance or increase in stocks and/or quality.	Benefit Variable: Evidence of maintenance or increase accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	No Evidence
	•Harvesting impact on natural food stocks and quality (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	4	4	-	4	-	4	-	5	-	4	4
	•Harvesting impact on harvesting sites and related habitats (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	4	4	-	4	-	4	-	5	-	4	4
	•Existence of identifiable market channels and economic profit associated	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit. If harvesting is exclusively public this criteria is not assessed.	Does not apply, not evaluated	Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated	Does not apply, not evaluated
	END VALUE FOR ES		((4+4+4+4+5)*1 = 4	((4+4+4+4+5)*1 = 4		((2+3+2+4+5)*1 = 3		((2+3+2+4+5)*1 = 3		((5+5+5+5+5)*1 = 5		((3+2+2+4+5)*1 = 3	((2+3+2+4+5)*1 = 3
2.4.1 Genetic Resources (potencial)	2.4 Plant and Animal Resources												
	•Site potential for genetic resources	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	4	4	-	3	-	3	- 3	5	-	3	3
	•Local or regional breeds favoured – Y or N?	Benefit Variable: Favoring of local or regional breeds accounts for a +1 benefit in the ES end value.	+1	+1	-	+1	-	+1	N	N	-	+1	N
	•Evidence of a conservation action plan for genetic resources – Y or N?	Benefit Variable: Evidence of a conservation action plan for genetic resources accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Evidence of genetic resources populations monitoring – Y or N?	Benefit Variable: Existence of monitoring evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Evidence of genetic relatedness studies – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
2. Provisioning 2.1 Food												
Harvesting (potential for	•Existence of natural food harvesting – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	Y	Y	-	Y	-	Y	-	Y	-	Y	Y
	•Existence of conflicts with the local population arising from natural food harvesting – Y or N?	Penalty Variable: Existence of conflicts has a penalty of -1 in the end value of the ES.	N	N	-	N	-	N	-	N	-	N	N
	•Site potential.	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	4	4	-	2	-	2	-	5	-	3	2
	•Conservation state of harvesting sites.	Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state.	4	4	-	3	-	3	-	5	-	2	3
	•Diversity of natural foods.	Point Variable: a 1 to 5 score is applicable, 1 corresponding to very low diversity and 5 to a very high diversity.	4	4		2		2		5		2	2
	•Evidence of maintenance or increase in stocks and/or quality.	Benefit Variable: Evidence of maintenance or increase accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	-	No Evidence	No Evidence
	•Harvesting impact on natural food stocks and quality (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	4	4	-	4	-	4	-	5	-	4	4
	•Harvesting impact on harvesting sites and related habitats (1 to 5 – Inverse of the previous).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	4	4	-	4	-	4	-	5	-	4	4
	•Existence of identifiable market channels and economic profit associated	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit. If harvesting is exclusively public this criteria is not assessed.	Does not apply, not evaluated	Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated		Does not apply, not evaluated	Does not apply, not evaluated
END VALUE FOR ES 2.4 Plant and Animal Resources			((4+4+4+4+4)/5)*1 = 4	((4+4+4+4+4)/5)*1 = 4		((2+3+2+4+4)/5)*1 = 3		((2+3+2+4+4)/5)*1 = 3		((5+5+5+5+5)/5)*1 = 5		((3+2+2+4+4)/5)*1 = 3	((2+3+2+4+4)/5)*1 = 3
2.4.1 Genetic Resources (potencial)	•Site potential for genetic resources	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	4	4	-	3	-	3	- 3	5	-	3	3
	•Local or regional breeds favoured – Y or N?	Benefit Variable: Favoring of local or regional breeds accounts for a +1 benefit in the ES end value.	+1	+1	-	+1	-	+1	N	N	-	+1	N
	•Evidence of a conservation action plan for genetic resources – Y or N?	Benefit Variable: Evidence of a conservation action plan for genetic resources accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Evidence of genetic resources populations monitoring – Y or N?	Benefit Variable: Existence of monitoring evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Evidence of genetic relatedness studies – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of genetic resources studies evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	-	No Evidence	-	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
3.2.3 Water Purification	•Water quality – Low or high quality?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	4	3	3	2	2	3	-	5	-	2	3
	•Evidence of measures to prevent or reduce fresh water contamination/degradation – Y or N?	Point Variable: a 1 to 5 score is applicable, 1 being a very low quality and 5 a very high quality.	Y	Y	-1	Y	-1	Y	-	Y	-	Y	Y
	•Capacity of existent plant communities to act as natural pollutants/excess nutrients filters and retention sinks.	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	4	3	3	2	2	3	-	5	-	2	3
	•Capacity of water purification through sediment infiltration (according to sediment type).	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.	4	3	3	2	2	3	-	5	-	2	3
	•Evidence of management actions taken to maintain soil and water biota integrity – Y or N?	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
	•Presence of buffer protection areas – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	Does not Apply	Y	Does not Apply	Y	-	Y	-	Does not Apply	Y
	•Is there a wastewater treatment (where appropriate) – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES. Penalty Variable: No compliance has a penalty of -1 in the end value of the ES. (only applied if the referred wastewater treatment is required)	Does not apply, not evaluated	Does not apply, not evaluated	Does not apply, not evaluated	Does not apply, not evaluated	Does not apply, not evaluated	Does not apply, not evaluated	Does not apply, not evaluated	-	Does not apply, not evaluated	Does not apply, not evaluated
END VALUE FOR ES			((4+4+4)/3)*0,5 = 2	((3+3+3)/3)*0,5 = 1,5	((3+3+3)/3)-1)*0,5 = 1	((2+2+2)/3)*0,5 = 1	((2+2+2)/3)-1)*0,5 = 0,5	((3+3+3)/3)*0,5 = 1,5	-	((5+5+5)/3)*0,5 = 2,5	-	((2+2+2)/3)*0,5 = 1	((3+3+3)/3)*0,5 = 1,5
3.2.4 Air quality*	•Air quality – Low or high quality?	Point Variable: a 1 to 5 score is applicable, 1 being a very low quality and 5 a very high quality.	4	4	4	3	4	3	3	4	-	4	4
	•Impact of property activity and management in air quality – Low or high impact?	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	4	4	2	2	4	2	2	4	-	4	2
	•Contributions of vegetation cover (main species composition, density, etc.) to air purification and quality.	Point Variable: a 1 to 5 score is applicable, 1 being a very low contribution and 5 a very high contribution.	4	4	3	1	4	1	1	4	-	4	3
END VALUE FOR ES			((4+4+4)/3)*1 = 4	((4+4+4)/3)*1 = 4	((4+2+3)/3)*1 = 3	((3+2+1)/3)*1 = 2	((4+4+4)/3)*1 = 4	((3+2+1)/3)*1 = 2	((3+2+1)/3)*1 = 2	((4+4+4)/3)*1 = 4	-	((4+4+4)/3)*1 = 4	((4+2+3)/3)*1 = 3
3.3 Prevention													
3.3.2 Fire prevention/control	•Evidence of compliance with national and local flood fire prevention laws and guidelines – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	Y	-	Y	Y	Y	-	Y	Y
	•Evidence of a fire prevention plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	Y	-	Y	Y	Y	-	Y	Y
	•Evidence of actions taken towards conservation and improvement of fire prevention zones – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	Y	-	Y	Y	Y	-	Y	Y
	•Evaluation of fire risk – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	Y	-	Y	Y	Y	-	Y	Y
	•Adequacy of land use mosaic to promote fire resistance where necessary.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.	5	4	-	5	-	5	5	5	-	-	5
	•Adequacy of vegetation structure to promote fire resistance.	Point Variable: a 1 to 5 score is applicable, 1 being a very low adequacy and 5 a very high adequacy.	5	4	-	5	-	5	5	5	-	-	5

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
END VALUE FOR ES			5*0,5 = 2,5	5*0,5 = 2,5	-	-	(3-1-1) *0,5 = 0,5	3*0,5 = 1,5	-	5*0,5 = 2,5	-	(3-1-1)* 0,5 = 0,5	3*0,5 = 1,5
3.4.2 High Conservation Value Areas (HCVA) and the existence of critically endangered (CR) and endangered (EN) habitats and species	•Evidence of a conservation action plan for HCVA (it could be a part of a broader plan, if applicable) – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES	Y	Y	-	-	-	Y	-	-	-	-	Y
	•State of habitats conservation	Point Variable: a 1 to 5 score is applicable, 1 being a very low conservation state and 5 a very high conservation state.	4	4	-	-	-	4	-	-	-	-	4
	•Evidence of a buffer zone for HCVA – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES	Y	Y	-	-	-	Y	-	-	-	-	Y
	•Evidence of a monitoring plan for HCVA and EN/CR species evolution – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	-	-	Y	-	-	-	-	Y
	•Evidence of management actions taken to conserve and maintain HCVA and EN/CR species – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES	Y	Y	-	-	-	Y	-	-	-	-	Y
	•Existence of a data based system – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.	N	N	-	-	-	N	-	-	-	-	N
	•Evidence of compliance with national and local laws in respect to FSC – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	-	-	Y	-	-	-	-	Y
	•Evidence of conservation ex situ and in situ of EN/CR species – Y or N?	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.	N	N	-	-	-	N	-	-	-	-	N
	•Best practices codes for HCVA are been taking into account – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	-	-	Y	-	-	-	-	Y
END VALUE FOR ES			4*0,5 = 2	4*0,5 = 2	-	-	-		-	4*0,5= 2	-	-	3*0,5 = 1,5
3.4.3 Biodiversity Bank function	•Capacity of the area to function as a biodiversity bank	Point Variable: a 1 to 5 score is applicable, 1 being a very low capacity and 5 a very high capacity.	5	5	-	-	-	5	-	-	-	-	2
	•Is management of the area designed to improve biodiversity bank functions? – Y or N	Benefit Variable: Existence of research activities evidence accounts for a +1 benefit in the ES end value.	N	N	-	-	-	N	-	-	-	-	N
END VALUE FOR ES			5*1 = 5	5*1 = 5	-	-	-		-	5*1 = 5	-	-	2*1 = 2
Total for ES group			29,67	28,33	5,5	13,83	9,83	13,83	8	31,17	0	12	17,17
Available points for ES group			35	35	35	35	35	35	35	35	35	35	35
Proportion			0,85	0,81	0,16	0,4	0,28	0,42	0,23	0,89	0	0,34	0,49
4. Cultural													
4.1 Human Well-Being													
4.1.1 Recreation Activities (potential)N	•Existence of recreation activities – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	0	0	-	0	-	0	-	-	0	0	0
	•Site potential for recreation activities	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	-	-	-	-	-	-	-	-	-	-	-
	•Impact of recreation activities on site (visitors records: n. º of visitor days and number of visitors in a given day, etc.).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	-	-	-	-	-	-	-	-	-	-	-
	•Economic profit	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.	-	-	-	-	-	-	-	-	-	-	-
	•Existence of a load capacity program – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	-	-	-	-	-	-	-	-	-	-	-

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
	•The recreation activities respect the feeding and reproduction periods– Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	-	-	-	-	-	-	-	-	-	-
	•Existence of identifiable market channels and economic profit associated.	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	-	-	-	-	-	-	-	-	-	-
	• Evidence of a recreation activities management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	-	-	-	-	-	-	-	-	-	-
END VALUE FOR ES			0	0	-	0	-	0	-	-	0	0	0
4.1.2 Tourism/Eco-tourismo (potential for the landowner)	•Existence of tourism ecotourism activities (it could refer to informal and sporadic activities) – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	Y	Y	-	Y	-	Y	-	Y	Y	Y	Y
	•Site potential for ecotourism activities	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	5	4	-	1	-	3	-	5	3	2	3
	•Impact of ecotourism activities on site (visitors records: n. º of visitor days and number of visitors in a given day, etc.).	Point Variable: a 1 to 5 score is applicable, 1 being a very high impact and 5 a very low impact (or virtually inexistent).	3	4	-	1	-	3	-	3	5	3	3
	•Existence of a load capacity program (if necessary, when there is well established program with a high visit/activity rate) – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Does not Apply	Does not Apply	-	Does not Apply	-	Does not Apply	-	Does not Apply	Does not Apply	Does not Apply	Does not Apply
	•The recreation activities respect the feeding and reproduction periods – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Does not Apply	Does not Apply	-	Does not Apply	-	Does not Apply	-	Does not Apply	Does not Apply	Does not Apply	Does not Apply
	•Evidence of a tourism and ecotourism management plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Does not Apply	Does not Apply	-	Does not Apply	-	Does not Apply	-	Does not Apply	Does not Apply	Does not Apply	Does not Apply
	•Evidence of a tourism and ecotourism monitoring plan – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Does not Apply	Does not Apply	-	Does not Apply	-	Does not Apply	-	Does not Apply	Does not Apply	Does not Apply	Does not Apply
	•Evidence of a Biodiversity Action Plan – Y or N?	Benefit Variable: Evidence accounts for a +1 benefit in the ES end value.	N	N	-	N	-	N	-	N	N	N	N
	•Evidence of good infra-structures	Benefit Variable: Existence of mapping assessments evidence accounts for a +1 benefit in the ES end value.	N	N	-	N	-	N	-	N	N	N	N
	•Existence of identifiable market channels and economic profit associated (if applicable, e.g. whenever the landowner possesses an economic profit with the activity).	Point Variable: a 1 to 5 score is applicable, 1 being a very low profit (or virtually inexistent) and 5 a very high profit.	Does not Apply	Does not Apply	-	Does not Apply	-	Does not Apply	-	Does not Apply	Does not Apply	Does not Apply	Does not Apply
END VALUE FOR ES			((5+3) /2)*1 = 4	((4+4) /2)*1 = 4	-	((1+1)/ 2)*1 = 1	-	((3+3) /2)*1 = 3	-	((5+3)/ 2)*1 = 4	((3+5) /2)*1 = 4	((2+3) /2)*1 = 2,5	((3+2) /2)*1 = 3
4.1.3 Landscape	•Evidence of conservation actions taken that preserve and improve landscape conservation state and scenic beauty – Y or N?	Penalty Variable: No compliance has a penalty of -1 in the end value of the ES.	Y	Y	-	Y	-	Y	-	Y	-	Y	Y
	•Contribution of landuse to overall conservation and appeal level of the landscape.	Point Variable: a 1 to 5 score is applicable, 1 being a very low contribution (or virtually inexistent) and 5 a very high contribution.	5	4	-	3	-	3	-	5	-	2	3

EGC	Variables/Indicators	Score and Criteria	Cork Oak Montado	Mix woodland	Eucalyptus plantation	Irrigated pasture	Maritime pine plantation	Meadow Pivot irrigation	Riparian gallery	Social area	Stone pine woodland	Water bodies
END VALUE FOR ES			5*1= 5	4*1= 4		3*1= 3		3*1 = 3		5*1= 5		2*1= 2	3*1= 3
4.2 Educational													
4.2.1 Education/Interpretation	•Site potential for educational activities	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	5	5	3	3	3	3	2	5	1	4	4
	•Evidence of good infra-structures	Benefit Variable: Existence of mapping assessments evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	
	•Evidence of good relationships between partners	Benefit Variable: Existence of mapping assessments evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	
END VALUE FOR ES													
4.2.2 Scientific Research/ Ecological Knowledge	•Existence of scientific research activities – Y or N?	Critical Failure Variable: if the answer is No the end value for the ES is 0.	Y	Y	Y	Y	Y	Y	Y	Y	-	Y	Y
	•Site potential for scientific research activities/ecological knowledge	Point Variable: a 1 to 5 score is applicable, 1 being a very low potential (or virtually inexistent) and 5 a very high potential.	4	4	2	3	3	3	3	5	-	3	4
	•Evidence of good infra-structures	Benefit Variable: Existence of evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence	-
	•Evidence of good relationships between partners taking part in scientific research activities	Benefit Variable: Existence of evidence accounts for a +1 benefit in the ES end value.	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	No Evidence	-	No Evidence	No Evidence	-
	•Evidence of results from scientific research activities and ecological knowledge	Benefit Variable: Existence of mapping assessments evidence accounts for a +1 benefit in the ES end value.	+1	+1	+1	+1	No Evidence	+1	No Evidence	No Evidence	-	+1	-
END VALUE FOR ES			(4+1)* 0,5 = 2,5	(4+1)* 0,5 = 2,5	(2+1)* 0,5 = 1,5	(3+1) *0,5 = 2	(3+1) *0,5 = 2	(3+1)* 0,5 = 2	3*0,5 = 1,5	5*0,5 = 2,5	-	(3+1) *0,5 = 2	4*0,5 = 2
Total for ES group			16.5	15.5	4.5	9	4.5	11	3.5	16.5	5	10.5	12
Available points for ES group			22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Proportion			0.73	0.69	0.20	0.40	0.20	0.49	0.16	0.73	0.22	0.47	0.53

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