Social and economic impact of managing forests with conservation goals

LIFE RedBosques experience

This document complements document B.18. *Informe de valoración de impacto del proyecto* (Assessment report on the project's impact) included in the approved technical proposal by LIFE Redcapacita_2015 (LIFE15 GIE/ES/000809).

LIFE RedBosques

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Partners: Generalitat de Catalunya, CREAF, Fundació Catalunya-La Pedrera.

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Introduction

After a centuries-old use devoted to timber extraction and firewood exploitation, the value of forests is being redefined in the light of increasing research on forests' ecosystem services. The reduction of traditional forest exploitations together with a greater protection of these habitats in order to preserve and promote these services, has led to a new scenario both for public and private forest owners: the forest, on top of being a reservoir for national resources, provides society with countless services and proposes new financing opportunities linked to these services.

This report brings together a summary of the economic and social benefits of managing Mediterranean forests while aiming at favouring forest maturity. The development of the LIFE RedBosques various actions has made clear that preserving and promoting forest maturity not only leads to positive effects on biodiversity preservation, but also to positive economic impact for forest owners and the society as a whole since employment for the professional sector grows. Moreover, evidence is provided of the project's effects when including the mature forest concept into the technical field, which are positive for nature conservation, but also for the forest management field. In particular, we describe some investments placed throughout the project's duration in order to identify mature stands and to improve forestry management, aiming at the promotion of maturity in particular and forest conservation in general. These results show the technical, economic and social potential that can be reached if these actions are replicated in a broader territory in the next years.

The value of forests: beyond the value of timber

Historically, timber, wood derivatives, and -to a lesser extent- other non-wood forest products, were the only supply goods to be included in the forest sector accounts (MAPA, 2019). Therefore, other goods and services have been underestimated since they were not included due to lack of awareness, their complicated economic assessment or their difficult allocation in terms of property (Figure 1).

At the beginning of the century, the 2005 Millennium Ecosystem Assessment established a new paradigm to assess ecosystem services worldwide; until then assessment was limited to the monetary valuation of those goods that had an allocated price in the market.

As opposed to other types of ecosystems, in the Mediterranean forests are especially relevant for the supply of raw materials, climate regulation (carbon sequestration), regulation of natural disturbances (fires, erosion) and as habitats for various species (EME, 2014).

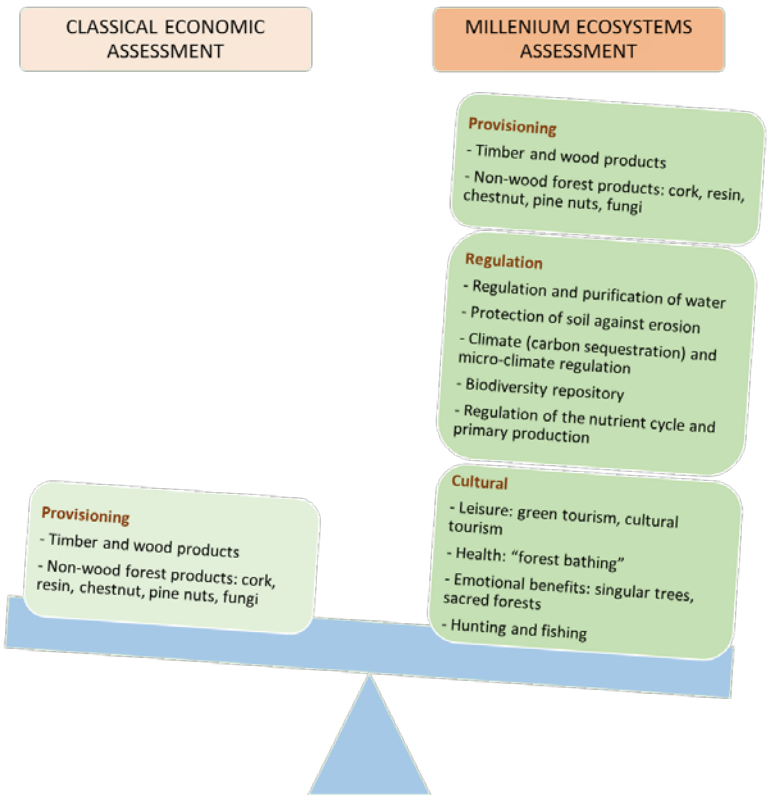


Figure 1. Services of Mediterranean forests ecosystems: classical assessment and Millennium Ecosystem Assessment. Source: EME, 2014

The inclusion of these services in economic assessment studies makes clear that timber and wood derivatives are not the main source of wealth in a Mediterranean forest: the average value of Mediterranean forest is 133 euros/ ha (Merlo & Croitoru, 2005), and timber products only account for 35% of that (Figure 2).

When applied to the Spanish case, other studies (Mavsar & Riera, 2007) estimate that profit stemming from non-monetizable ecosystem services when replacing marginal agricultural areas with forests could range from 464 to 4,100 euros/ ha.

Some goods and services that were not included in the monetary market were already known and promoted in the past. During the 15th century, in some areas of the Mediterranean basin, the main reason to protect and keep forests in good condition was the protection of the soil and the conservation of water resources, while timber extraction was secondary (Palahi et al., 2008).

Other services, even if well-known, should be considered emerging services since their quantitative relevance and value are recent. The touristic appeal of forests is one of the cultural services that society increasingly demands. Revenues ranging from 2.5 to 11 euros per visitor have been estimated in Italian and French forests (Scherrer, 2002; Bellu & Cistulli, 1997).

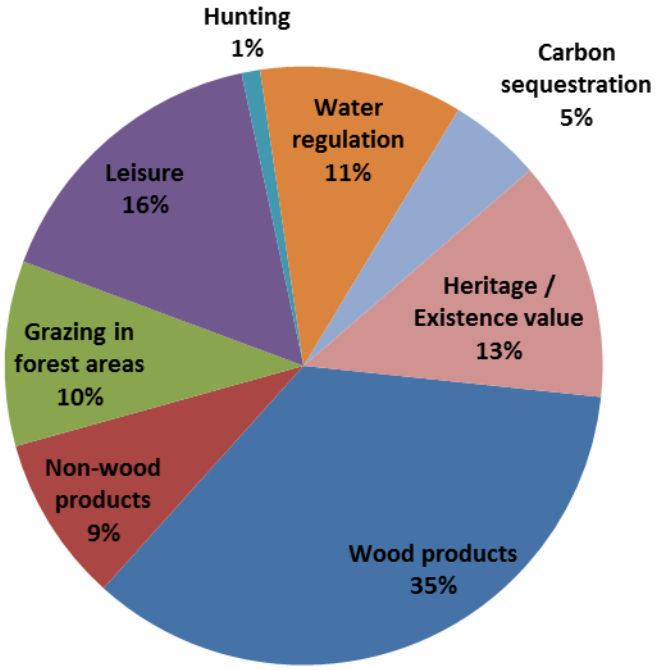


Figure 2. Breakdown of Mediterranean forests total economic value. Source: Merlo & Croitoru, 2005.

Some more or less recent practices such as *shinrin-yoku* or “forest bathing” (walks in the forest) have proven to have positive effects on people’s moods (Jin Park et al., 2010; Johnsen y Rydstedt, 2013) and to reduce the risk of cardiovascular diseases (BFW e ILEN, 2017).

Greater forest maturity increases the services that forests can provide

LIFE RedBosques is proving some of the facts underlined by recent scientific research in the field: managing forests with the objective of increasing structural heterogeneity and biodiversity, big trees presence and the opening of gaps (in short, increasing the maturity of forests) lead to the provision of several of these ecosystem services (Felipe-Lucía, Soliveres et al., 2018).

Many forest attributes (for instance, the forests' vertical and horizontal diversity, the variety of shrubs and tree species, tree regeneration or the amount of fallen and standing dead trees) contribute, to a greater or lesser extent, to foster many ecosystem services. The following stand out: carbon fixation in tree species, the wood reservoir itself, control of phytophagous species and other emerging cultural services such as ornithological tourism (Figure 3).

Moreover, greater structural diversity is linked with a lower fire risk and greater resilience of the forest mass in case of fire (Palahi et al., 2008). On a landscape level, the studies show that an approach where forest management includes stands that have evolved naturally together with other stands over which there has been different levels of intervention, leads to multifunctional forest systems not only limited to the provision of wood services.

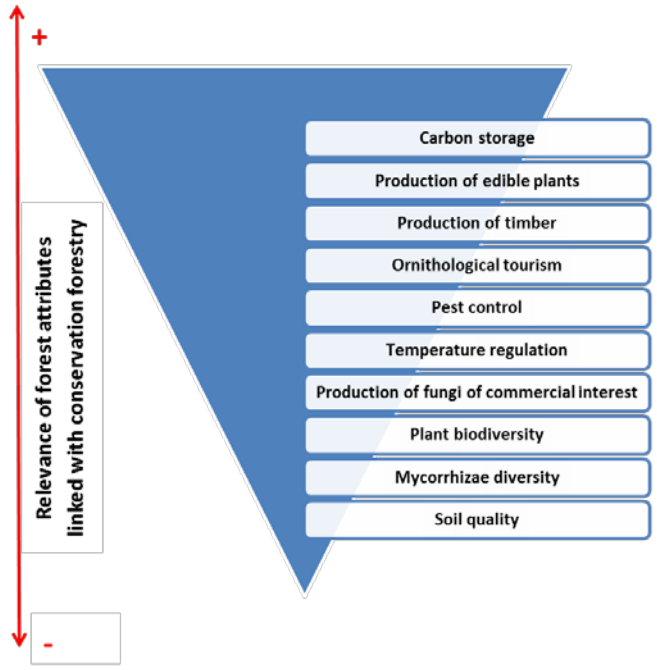


Figure 3. The importance of forest attributes linked with the conservation forestry (structural heterogeneity, biodiversity, fallen and standing dead trees) for ecosystem services in Central Europe temperate forests. Source: Felipe-Lucía, Soliveres et al.,2018.

The conservation of forest habitats: a financing opportunity

One of the major challenges identified by the European Commission is including the value of ecosystem services provided by Natura 2000 Network. In 2004, the Commission adopted the *integration approach* to include this need across all main European Funds.

In addition to LIFE, The European Agricultural Fund for Rural Development (EAFRD) is the Fund with greater financing capacity addressing activities linked with forest management and nature conservation.

The European Rural Development Policy 2014–2020 -part of the EU's Common Agricultural Policy- is implemented through Rural Development Programmes (RDPs). In Spain, these programmes are deployed through a national plan and 17 regional programmes.

Current regional rural development programmes 2014–2020 include a set of measures that specifically aim at financing actions in forests (Table 1). In most cases, these measures are implemented through direct investments by the programme's management body or through grants awarded both to private owners and associations, and to public entities.

Since each region has developed their own rural development strategy, not all the described measures are included in all RDPs. Moreover, the same measure can be used to finance different actions depending on the strategy. In this sense, it is key that the teams responsible for RDPs (the ones managing forests and the ones in charge of nature conservation) cooperate in the design, execution and follow-up of the aforementioned RDPs.

Table 1. Post-LIFE financing options for measures promoted by RedBosques through the Rural Development National Plan and the Rural Development Regional Plans.

Redbosques measure	Funding sources	Example of measure for co-funding
Identification and characterization of reference stands	Measure 1 (RDP and RDNP). Knowledge transfer and information activities	Training managers and forest owners on the identification and characterization of stands in mature or close-to mature forests
	Measure 2 (RDP). Counselling services to forest holdings	Counsel to forest managers and owners on how to promote maturity. Setting visit programmes to mature stands
	Measure 7 (RDP). Basic services and renewal of populations in rural areas	Drafting of studies and information material on the value of mature forests
Forest management and planning with conservation and climate change adaptation goals	Measure 1 (RDP and RDNP). Knowledge transfer and information activities	Training activities on new forest management models based on process conservation
	Measure 2 (RDP). Counselling services to forest holdings	Counselling or visits to pilot properties
	Sub-measure 4.4. (RDP). Non-productive investments in the forest sector	Investments aiming at protecting habitats that are considered a priority

Table 1 (cont.). Post-LIFE financing options for measures promoted by RedBosques through the Rural Development National Plan and the Rural Development Regional Plans.

Redbosques measure	Funding sources	Example of measure for co-funding
Forest management and planning with conservation and climate change adaptation goals	Sub-measure 8.5. (RDP). Investments that increase forests' adaptation power and environmental value	Forestry interventions with conservation or maturity promotion goals
	Sub-measure 15.1. (PDR). Forest, environmental, climate and conservation services	Compensations to owners in case of loss of income caused by their agreement to reduce or eliminate timber exploitation
Dissemination of results	Sub-measure 20.2 (RDNP). National Rural Network	Submission of the results and outcomes of the Project to the Rural National Network so that they are broadly widespread.

From theory to practice…

Some public administrations have already launched actions to promote and preserve forest maturity that are in line with LIFE RedBosques objectives and goals. These are some examples:

Technical Counselling for the identification and characterization of mature-old forest stands in Aragon.

Specific goals:

- Technical counselling to define the characteristics of an old-mature stand for each of the forests included in Annex I of Directive 92/43/CEE that can be found in Aragon.
- To identify and characterize an old-mature stands for each of the forests included in Annex I of Directive 92/43/CEE that can be found in Aragon.

Funding source: co-funded by EAFRD through Aragon's RDP 2014–2020, measure 7.1a "Drafting and updating management plans for Protected Areas, Natura 2000 Network, and valuable natural heritage elements or areas".

Decree 8/2018, of January 29th, by the Agriculture, Environment and Rural Development Office, that establishes regulatory principles for grants that compensate forest commitments (Castilla-La Mancha).

Specific goals: to compensate owners for their voluntary commitment with climate and forest responsible management in order to favour conservation, improve biodiversity, protect and promote the forests' exceptional and singular values, when their implementation entails an additional cost or loss of income for these owners.

Funding source: co-funded by EAFRD through RDP 2014–2020 in Castilla-La Mancha, sub-measure 15.1.

RedBosques helps increase the value of forests in private properties at Els Ports Natural Park

Els Ports Natural Park has played a key role in the development of RedBosques project, highlighting the joint effort of public institutions and private owners. The planning and execution of the project's actions bear in mind the forest's multifunctionality across three private properties. Production, protection and biodiversity conservation aspects were included in the general and specific objectives (Table 2).

Table 2. General and specific objectives included in the management of Habitats of Community Interest. These goals were drafted for three private properties located at Els Ports Natural Park.

Improvement in the conservation and production of forest objects in order to obtain
• Quality wood products
• Greater specific and structural diversity in forest stands
• Consolidation of habitats of Community interest
• Maintenance of small clearings with sufficient functional ability
Promotion of truffle and hunting as productive assets
• Favouring adequate conditions for truffles to develop
• Maintaining small clearings with sufficient functional ability
Protection of water basins and protection against erosion
• Guaranteeing forest cover to protect the environmental goods and services provided by forests
Conservation and promotion of natural processes in areas of outstanding ecological value
• Naturalizing and increasing forest resilience
Improvement of infrastructures and increase of goods and services provided by the property
• Improvement and maintenance of the road network
• Promotion of regulated ecotourism
Fire prevention and suppression
• Maintenance of a defence infrastructure network (both in the massif and the property)

These three private properties' previous management systems were based on productive approaches. The old systems did not include a detailed economic assessment of the forests' ecosystem services beyond revenue coming from timber exploitation or non-wood products such as hunting or truffle.

The decline of the local forest sector and timber low prices in the last 20 years had resulted in stopping almost every forest intervention practices in Els Ports properties (Figure 4). In this context, timber extraction is no longer a profitable activity in most forests, both public and private. This effect has led to change the productive scenarios for forest owners, since they have realised that non-wood resources are now more relevant in daily forest management activities.

This situation results in a new paradigm for property management, where hunting, pasture and truffles replace wood products as main productive objectives (Sabaté et al., 2013). Moreover, conservation guidelines set in the Habitats Directive conservation and in National and Regional legislation force the properties to plan and implement management criteria and objectives that address the improvement and maintenance of habitats and to adapt to new climate change scenarios.

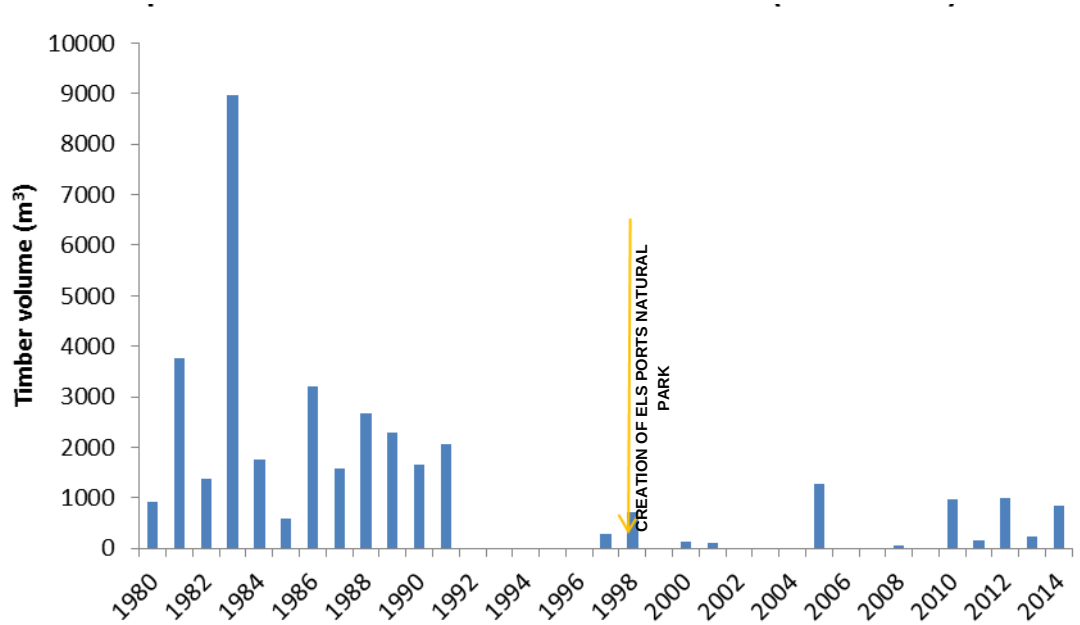


Figure 4. Evolution of the volume of harvested timber (in m³) in Els Ports area (period 1980–2014). Source: Els Ports Natural Park.

The forestry management plans set through the project establish an economic assessment of ecosystem services that has been estimated with measure 15.1 of EAFRD[1], and only for forest stands that can be used with natural evolution objectives (area that could fall under this measure if implemented by Catalonia's RDP in terms of loss of profit due to suppression of use). Therefore, the total value of services for the intervened area is clearly higher.

Table 3 breaks down balance results (euros/ha) of actions performed in two private properties located at the Natural Park. The action execution expenses and revenue generated during the plan (10 years) are included, in two different scenarios:

Scenario 1: Only includes revenue resulting from timber extraction and hunting activity in stands that were somehow used or intervened.

Scenario 2: It includes scenario 1. But it also includes potentially perceived revenue due to the hypothetical implementation of EAFRD's measure 15.1 in forest stands addressing natural dynamics and therefore subject to financial compensation.

In case of property B, the execution of pilot actions can be self-financed only through revenue generated by the sale of timber and the forest hunting use. If, in addition, compensation for loss of profit due to conservation and adaptation to climate change goals is considered as set in measure 15.1 of EAFRD, the economic balance-sheet comes out as positive in both properties.

Tabla 3. Economic balance-sheet (euros/ha) between the cost of executed pilot actions and revenue to be perceived during the plan's validity period (10 years) considering two different scenarios for two private properties at Els Ports Natural Park.

CONCEPT	Property A (225 has intervened)	Property B (208 has intervened)
EXECUTION EXPENSES		
Processes conservation forestry in forest areas	16,30	29,51
Processes conservation forestry in clearing areas	14,46	12,18
Forestry actions based on model ORGEST PN-10 [2]	26,22	0,00
Truffle improvement actions	23,18	1,15
Defence actions against forest fires	42,67	9,78
Actions on the road infrastructure	23,56	25,48
Improvement of public use infrastructure	66,67	0,00
Other improvements	15,56	0,00
TOTAL EXPENSES (A)	228,61	78,12
REVENUE		
Processes conservation forestry in forest and/or clearing areas	4,78	52,02
Hunting use	26,67	28,85
TOTAL REVENUE (TIMBER+ HUNTING) (B)	31,44	80,87
BALANCE - SCENARIO 1 (B-A)	-197,17	2,75
COMPENSATION - MEASURE 15.1 EAFRD (C)	218,59	146,85
BALANCE - SCENARIO 2 (B-A+C)	21,42	149,60

[1] Top provision of 200 euros / ha – year is the reference, as estimated in some regional RDPs.
[2] Orientaciones de Gestión Forestal Sostenible de Cataluña (ORGEST).

RedBosques promotes public investment in the management of forest habitats with maturity and conservation in mind

The implementation of this new forest management paradigm is an opportunity to mobilize economic resources from the public administration. These resources are allocated to gain knowledge or to implement new forestry management plans.

RedBosques has achieved an outstanding multiplier effect for entities that were not part of the project's partnership. At the closing of the project, five regions and *Monte de Valsaín* forest (depending on national parks agency-OAPN) had invested 160,620 euros in identifying and characterizing mature stands in their territories (Table 4), following LIFE RedBosques methodology. These projects were executed by companies in the forestry sector through technical assistance.

Table 4. Investments to identify and characterize mature stands carried out but various national and regional administrations stemming from LIFE RedBosques project

Region	Amount (euros)
VALENCIAN COMMUNITY	26,933
NAVARRE	21,483
BASQUE COUNTRY	54,450
CASTILE-LA MANCHA	40,894
CATALONIA	9,700
OAPN (Montes de Valsaín)	7,159
TOTAL	160,619

In two autonomous regions and in Valsaín Forest, forest management guidelines were drafted to include conservation goals and to follow LIFE RedBosques premises. These guidelines apply to six Sites of Community Importance/SACs[3] and to publicly owned forests that belong to the State, the region or a town (Table 5).

Table 5. Forest management plans and investments to this aim promoted by varied public administrations thanks to LIFE RedBosques project (period 2017-2019).

Body	Hectares under forest management plan	Investment thereof (euros)
ARAGON (Zaragoza's Environmental Regional Service)	13,791	91,970
CATALONIA (Els Ports Natural Park)	1,001	27,000
OAPN (Montes de Valsaín)	10,636	178,753
TOTAL	25,428	297,723

In the Basque Country's case, RedBosques experience has been used to review the natural resources management plans for five natural parks that fall into SACs[4]. Up to four categories are established (fully protected reserves, scientific reserves, network of micro-reserves /senescence stands, habitat trees) when zoning in order to promote and maintain forest maturity in habitats of Community interest.

Catalonia's Government has invested 8,867 euros to implement the follow-up of Life RedBosque demonstrative actions through geomatics (drones and photogrammetry). Catalonia's natural heritage and biodiversity strategy[5] openly refers to LIFE RedBosques in its planning document as the core project to use as a starting point when developing a conservation project for mature forests. One of the strategy's objectives is the creation of a free evolving forest reserves network, supported by the participation of forest owners and other concerned sectors.

On the other hand, and in order to comply with the Habitats Directive, Castile-La Mancha Regional Government has included the RedBosques methodology as part of their assessment and follow-up plan for forest habitats of community interest and their conservation condition on a regional level. In particular, RedBosques methodology is used for the forest habitats structure and function parameters.

[3] ES2430102-Sierra Vicort, ES2430078-Montes de Zuera, ES2430103-Sierra de Algairén, ES2430088-Barranco de Valdeplata, ES4160109-Sierra de Guadarrama, ES5140011-Sistema prelitoral meridional.
[4] ES2110009-Gorbeia, ES2110019-Izki, ES2110024- Valerejo-Sobrón-Sierra de Árcena, ES2130001-Armañón, ES2130009-Urkiola.
[5] GOV/54/2018 Agreement, July 17thm that aproves the Natural Heritage and Biodiversity Strategy for Catalonia 2030.

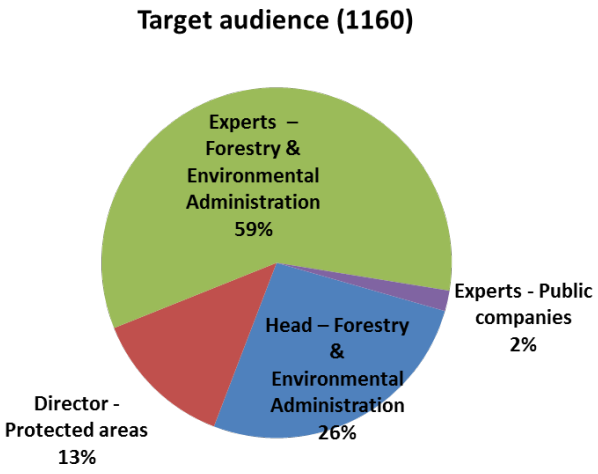
At European level, the project's guidelines and conclusions were collected by the European Commission to be considered when designing new European forestry strategy and climate change adaptation strategy.

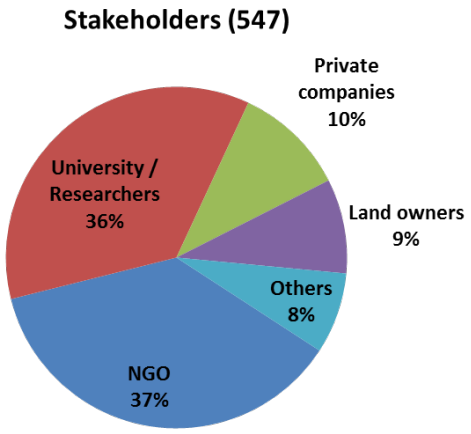
RedBosques: A network of professionals who are committed with forest conservation

A new approach to forest management needs new scientific knowledge, effective transfer of that knowledge into management and identifying good practices and sharing them with the agents involved. One of the keys of success and the spread into different management fields of our LIFE RedBosques project and its approach has been its outreach, thanks to communication and training actions. Some of the data for this impact are:

Creation of knowledge networks (action A1)

The project's directory has been fed with 1,707 contacts linked with forest management and Natura 2000 Network, owners and owners' associations, universities and research centres, NGOs and companies belonging to the environment and the forest sectors.





During the project's execution period, 123 experts joined the project's reference group. They have actively participated in the working forum and have received information on the progress and decisions taken in the LIFE RedBosques framework.

Exchange programme for experts (action B2)

Four actions were organized and 38 experts participated under the mobility programme for public administration and public companies that are involved in forest management and in Natura 2000 Network. These 38 experts come from 11 different regional administrations, one provincial council, one Island Council and one town council.

Technical workshops (actions B3, B4 and B5)

104 people participated in the three technical workshops that were held as part of LIFE RedBosques actions. The participants work for regional, national and local institutions and also for public companies and universities.

Training (action B8)

The course “Mature forests: values, characterization and management criteria” has been celebrated three times and there has been high demand in all three occasions: 344 applications for 75 posts. The course was advertised via our list of contacts, social networks and *Quercus journal*.

Some administrations as Els Ports Natural Park, have included the attendance to this course as one of the criteria to be considered when allocating forest contracts.

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