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FSC FOREST CERTIFICATION AS A CONSERVATION TOOL IN PORTUGAL: IMPACTS AND POTENTIALITIES

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Abbreviations and acronyms

AGFR: Association for the Responsible Forest Management (*Associação para uma Gestão Florestal Responsável*)
CAR: Corrective Action Request
DRRF: Direção Regional dos Recursos Florestais
EU: European Union
FM: Forest Management
FMU: Forest Management Unit
FSC: Forest Stewardship Council
HCV: High Conservation Value
HCVF: High Conservation Value Forest
ICNF: Institute for Nature Conservation and Forests (*Instituto da Conservação da Natureza e das Florestas*)
IFN: National Forest Inventory (*Inventário Florestal Nacional*)
NC: Non-conformities
PEFC: Programme for the Endorsement of Forest Certification
PES: Payments for Ecosystem Services
RNAP: National Network of Protected Areas (*Rede Nacional de Áreas Protegidas*)
SAC: Special Areas of Conservation
SLIMF: Small and Low Intensity Managed Forests
SFM: Sustainable Forest Management
SNAC: National System of Classified Areas (*Sistema Nacional de Areas Classificadas*)
SPA: Special Protection Areas
UNESCO: United Nations Organization for Education, Science, and Culture
WWF: World Wide Fund For Nature

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Summary

High Conservation Values (HCV) is a concept introduced by the Forest Stewardship Council that focuses on outstanding forest attributes that need extra consideration when developing sustainable forest management in certified forest areas. The aim of this study is to evaluate the contribution of the FSC HCV approach on conservation focusing on selected Portuguese forest management units. To do so, it was described the HCVs presence in Portugal and the role of FSC certification on enhancing protection outside of formally protected areas and the impacts of the approach implementation for certified organizations was analysed. This study used primary data from a mail survey to the FSC certificate managers of areas with HCV and secondary data from FSC audit reports. Due to the lack of standardization, results from secondary data analysis are not considered to be entirely reliable, but a starting point for further research. Data was analysed through descriptive statistics on Microsoft Office Excel. Results concluded that FSC HCV approach contributes to conservation in certified forests in Portugal. Although HCV areas only account for approximately 6% of the certified forest area, measurement of changes caused by the approach implementation for the certified organization demonstrated a positive impact on forest certification. Moreover, the study also highlighted the role of certification in preserving HCVs present outside of traditionally protected areas like Natura 2000 or national protected areas. Also, survey answers pointed out that certificate managers consider the HCV approach to have an overall positive impact, although weaknesses were pointed out: lack of standard reporting and need of better guidelines. In order to improve the future of the HCV approach, improvement suggestions were done on report standardization, increased certified organizations guidance and increase of HCV importance under the FSC forest certification scheme.

1. Introduction

1.1 State of the art

In the last decades, Sustainable Forest Management (SFM) became the main paradigm for discussing forest management (FM) and nature protection (Cubbage et al., 2010). Forest resources are essential at a global level, not only for biodiversity but for the multiple ecosystem services they provide, including non-material ones like regulating and cultural services, as well as material ones, like provisioning services (e.g. wood, bioenergy, fibres and wild forest products) (Siry et al., 2005). Because of the multifunctional role of forests, SFM needs to address ecological, social and also economic components of forestry (Cubbage et al., 2010).

The concept of sustainable development started getting global recognition in the early 1990s (Forest Europe, 2016) and in 1992, during the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit in Rio de Janeiro, world leaders developed non-binding guidelines for improving forest protection, englobed in the Statement of Forest Principles (Siry et al., 2005). But the guidelines' failure to become binding created a general concern about deforestation that lead disappointed groups to take action and, one year later, create the first forest certification initiative and scheme, the Forest Stewardship Council (FSC) (FSC Portugal, 2016).

Forest certification emerged as a market-oriented policy instrument in a period when decision-making power was transitioning from traditional government authorities to economic, social and environmental organized interest groups (Cashore, 2002 and 2003). Forest certification promotes SFM through the implementation of management standards and the use of labels to differentiate certified forest products from the conventional ones (Pokomy et al., n.d.). Forest certification has spread around the world and it became one of the main ways for producers and consumers to identify and verify sustainable forestry (Cubbage et al., 2010). Moreover, the core forest certification principles have made it become a driving force in SFM discussions and

policy makers recognise it as a well-consolidated market-based approach to environmental protection and SFM (Cashore et al., 2004; Moore et al., 2012).

The FSC was the first organization to develop an independent forest certification scheme (FSC International, 2019), but in the past decades additional and different forest certification schemes were created both at the national and international level (Maesano et al., 2016). Since 1993, forest certification has spread rapidly and by mid-2019 430 million ha were certified by the two main forest certification schemes, FSC and the Program for the Endorsement of Forest Certification (PEFC) schemes (FSC International, 2019; PEFC, 2019).

Almost all SFM standards include reference to aspects like biodiversity, watershed or erosion control functions protection (Jennings et al., 2003), but only FSC standards introduced the concept of High Conservation Values (HCV). HCVs approach focuses on outstanding forest attributes that need extra protection to ensure the conservation of the identified values (Ioras et al., 2009; Bugalho and Santos, 2018). There are six HCV categories, that will be described more in detail in chapter 2.2, and include rare, threatened or endangered species, ecosystems and habitats and environmental services, social and cultural values (Maesano et al., 2016). These categories defined by FSC are generic enough so that they can be applied and adapted to any forest type and any country socio-cultural context (Jennings and Jarvie, 2003).

The HCV concept can be relevant for SFM even beyond forest certification. One of the interesting aspects of the HCVs approach indeed is that HCVs do not exist only in already officially protected areas. In fact, many areas with HCVs can be found in forests managed for production purposes outside formally protected areas (Maesano et al., 2016). HCVs identification in a forest does not forbid productive management operations like timber or non-wood forest products harvesting (Jennings et al., 2003; Jennings and Jarvie, 2003). Instead, it leads to a planning and implementation of management practices that can ensure the conservation of the HCVs while it maintains sustainable human activities in the forest. Because of this, HCV approach is becoming more used as a tool to improve FM operations (Maesano et al., 2016).

The HCV concept has been adopted beyond its original use on forest certification. It is used within standards for the production of important tropical crops like palm oil or soy (Brown et al., 2013; Areendran et al., 2020), it is also included in the Climate, Community and Biodiversity Alliance certification scheme and it is also gaining importance within policies and land-use planning (Ioras et al., 2009, Sheil et al., 2010). Many conservationists and producers see the HCV approach as a practical way to control or mitigate the negative impacts of production, mainly in forestry and agricultural sectors (Senior et al., 2015).

Despite the fast spreading of the HCV approach, its effectiveness in enhancing biodiversity conservation is debated because of the lack of data and other methodological limitations for rigorous studies (Di Girolami and Arts, 2018). The academic literature about it is limited and it is difficult to demonstrate the conservation benefits over just indirect or circumstantial evidence (Sheil et al., 2010; Areendran et al., 2020).

There exist some HCVs assessments, like the impact of HCV forests (HCVF) in Bosnia and Herzegovina and Romania forest policies (Ioras and Dautbšić, 2008; Ioras et al., 2009). There are also some HCV identification studies, like the HCV identification and first national mapping in Italy (Maesano et al., 2011; Pignatti et al., 2012; Maesano et al., 2016) or the HCV identification in natural production forest to support implementation of SFM certification in Indonesia (Sulistioadi et al., 2010). HCV and HCVF concepts are also included in other studies, such as a study about the effects of forest certification on biodiversity (Gullison, 2003) or a study on boreal biodiversity conservation (Elbakidze et al., 2011). Moreover, WWF developed a document offering different examples of HCV implementation around the world, one of the cases being the *montado* landscape conservation in Portugal (Rietbergen-McCracken et al., 2007).

The *montado* silvo-pastoral system is probably the most iconic forest type in Portugal, mainly due to cork production, but also because these forests are important biodiversity hotspots. HCV identification was applied in the cork oak landscape of Southern Portugal (Bugalho, 2016). Still, as it will be further explained within this thesis, Portugal has other FSC certified forest areas, characterised by different forest

types, ownership conditions and production contexts, where HCV have been identified and are managed.

1.2 Objectives and research questions

The main aim of this study is to evaluate the contribution of the FSC HCV approach to conservation focusing on selected Portuguese forest management units (FMU).

The general objective is further defined into the following specific objectives:

1. To identify what HCV are being protected in Portuguese FSC certified areas in terms of:
    - 1.1 Presence of HCV in FSC certified forests in Portugal
    - 1.2 Abundance of each HCV class within FSC certified forests in Portugal
    - 1.3 Species, habitats, landscapes, ecosystem services and social/cultural values preserved in Portugal under the HCV approach.
2. To evaluate the impact of HCV approach on FSC forest certification in enhancing conservation outside traditionally and formally protected areas, like Natura 2000 network sites or Special Nature Protection areas.
3. To describe the pros and cons of HCV conservation management approach for certified organizations, with regard to economic, environmental and social aspects.
4. To organize findings under the form of lessons learnt to inform future policy making and FM choices.

1.3 Structure of the thesis

This thesis is divided in six chapters and follows a regular scientific research structure.

Chapter 1 includes the Introduction, where the main research topic is reported and some background information is given about how forest certification and the HCV concept developed over time. In this chapter the general and specific research objectives are also stated.

Chapter 2 introduces in more detail the key concepts and definitions for FSC certification and HCV approach. It also sets the background for the Portuguese forest and conservation context.

Chapter 3 describes the research methodology, starting with a brief description of the research approach, data collection methods and finally the data analysis methodologies. Then a description of the study area, covering all the FSC certified organizations with HCV within their certified areas, is provided.

In Chapter 4 the research results are presented with the support of summary visual materials, like tables and charts.

In Chapter 5 results are discussed and research limitations identified. Furthermore, some suggestions for both future research and future management practices are discussed.

Finally, Chapter 6 presents the conclusions drawn from the results and further analysis of the study.

2. Background

2.1 FSC forest certification and HCV approach

2.1.1 FSC certification

The FSC is an international non-governmental organization created with the mission to promote environmentally appropriate, socially beneficial and economically viable management of the world's forests (FSC International, 2015). It is an international organization with more than 800 members, which include a diversity of both environmental and social organizations, enterprises and professionals from the forest sector, forestry groups, indigenous organizations and certification bodies (FSC Portugal, 2016).

FSC provides a system for the voluntary, independent third-party forest certification, which includes standards and a product labelling system that allows consumers to identify wood products from forests managed in a sustainable way (FSC International, 1996).

To develop this standard system, FSC defined some Principles and Criteria (P&C) about FM that are used as a worldwide reference (FSC Portugal, 2016). FSC P&C were published for the first time in November 1994 as a mainly performance-based worldwide standard, which means that they focus on FM field performance results more than on the management itself to deliver the corresponding results (FSC International, 2015). There are 10 FSC Principles that set the rules for the essential elements of FSC vision and each one is supported by a number of criteria that help to judge if the principle is met by the certified organization. The Principles are showcased below in Box 1. It is necessary to state that there is not any hierarchy amongst the 10 Principles, all of them are equally important and are applied together for the certification process (FSC International, 2015).

Box 1. FSC international forest stewardship principles

Principle 1: Compliance with laws. The Organization shall comply with all applicable laws, regulations and nationally ratified international treaties, conventions and agreements.

Principle 2: Workers' rights and employment conditions. The Organization shall maintain or enhance the social and economic well-being of workers.

Principle 3: Indigenous peoples' rights. The Organization shall identify and uphold indigenous peoples' legal and customary rights of ownership, use and management of land, territories and resources affected by management activities.

Principle 4: Community relations. The Organization shall contribute to maintaining or enhancing the social and economic well-being of local communities.

Principle 5: Benefits from the forest. The Organization shall efficiently manage the range of multiple products and services of the Management Unit to maintain or enhance long term economic viability and the range of environmental and social benefits.

Principle 6: Environmental values and impact. The Organization shall maintain, conserve and/or restore ecosystem services and environmental values of the Management Unit, and shall avoid, repair or mitigate negative environmental impacts.

Principle 7: Management planning. The Organization shall have a management plan consistent with its policies and objectives and proportionate to scale, intensity and risks of its management activities. The management plan shall be implemented and kept up to date based on monitoring information in order to promote adaptive management. The associated planning and procedural documentation shall be sufficient to guide staff, inform affected and interested stakeholders and to justify management decisions.

Principle 8: Monitoring and assessment. The Organization shall demonstrate that progress towards achieving the management objectives, the impacts of management activities and the condition of the Management Unit, are monitored and evaluated proportionate to the scale, intensity and risk of management activities, in order to implement adaptive management.

Principle 9: High conservation values. The Organization shall maintain and/or enhance the high conservation values in the Management Unit through applying the precautionary approach.

Principle 10: Implementation of management activities. Management activities conducted by or for the Organization for the Management Unit shall be selected and implemented consistent with the Organization's economic, environmental and social policies and objectives, and in compliance with the Principles and Criteria collectively

2.1.1.1 FSC Portugal

Being an international organization that promotes an international forest certification scheme, FSC has national independent offices around the globe. These offices are created after a process that starts with having a contact person in a country, then changing to a national representative and finally developing into a full national office. In the case of Portugal, this process was started in 2006 and, like in other countries, it

was facilitated by the World Wide Fund For Nature (WWF) (FSC Portugal, 2020). At the end of 2007 it was created the *Associação para uma Gestão Florestal Responsável* (AGFR) (in English: Association for the Responsible Forest Management), a non-profit organization with the only aim to represent and manage the FSC scheme in Portugal. AGFR was formally recognized as an FSC national office on 1st July 2010, and since then it can use the FSC Portugal name (FSC Portugal, 2016).

The above-presented FSC P&C set the basics for the development of standards at lower, i.e. either national or regional, scales. These local standards set specific requirements and different levels of expectations depending of each national or regional context, which allows to address local circumstances in a better way (Ioras et al., 2009).

FSC Portugal developed the Portuguese FSC National FM Standard between 2013 and 2015: it applies to all types of forests in Portugal, from plantations to semi-natural and finally natural forests. It also applies to forests characterised by different scales/sizes - from industry owners to smallholders - and production intensities - from eucalyptus plantations to *montado* systems (FSC Portugal, 2016). The Portuguese FSC National FM Standard is available at FSC Portugal website (FSC Portugal, 2020) for further consultation.

2.1.2 FSC Principle 9: High Conservation Value Forests

The concept of High Conservation Value Forests (HCVF) was introduced by FSC for the first time in the version 4.0 of its P&C in 1999 (Jennings et al., 2003; Brown et al., 2013). It is a concept specifically developed for the aims of forest certification with a focus on conservation of outstanding or critical forest attributes that need a greater degree of protection (Ioras et al., 2009; Bugalho and Santos, 2018). These forest attributes are called HCVs and are presented in detail in FSC Principle 9 (Brown et al., 2013). A HCVF is the forest area necessary to conserve or enhance an HCV and it can be just a part of a larger FMU or the entire FMU (Jennings, 2004).

HCVs stretch from biodiversity concentration areas and ecological services to cultural and social aspects, amongst others. Principle 9 presents four criteria that define the implementation approach of the HCVF concept: HCVs identification, stakeholder consultation, management measures to maintain or improve HCVs and monitoring the management effectiveness (FSC International, 2015; Bugalho and Santos, 2018). HCVs identification is key to the successful implementation of the approach (Ioras et al., 2009) and it involves identifying HCVs present in the FMU, but also any other HCV in the wider landscape scale which could be affected by activities performed within the FMU. Identification shall be done via stakeholder consultation and the analysis of existing information (maps, protected areas, endangered species lists, etc.) (Brown et al., 2013).

A basic aspect of HCVs identification is the interpretation of what the six HCVs definitions mean at the local context (Brown et al., 2013). FSC provides a generic definition of each HCV in its Principle 9, but then this global definition shall be adapted to different forest types, locations as well as socio-economic circumstances (Jennings et al., 2003) so that forest managers and other practitioners can use the HCV approach efficiently. The most common way to adapt the global HCVs definitions to the local scale is to develop HCV national interpretations (HCVNIs) (Jennings et al., 2003), i.e. documents that provide guidance for the identification and definition of HCVs within a specific national context (Brown et al., 2013).

A suitable example of how different countries with similar context address HCVs in forest certification is provided by Western European Mediterranean countries, i.e. Portugal, Spain, France and Italy. All four countries have their own national FSC FM standard, but not all of them have HCV national interpretations. For instance, in Spain the Generic guide for HCV identification developed by the HCV Network is still in use, even though there are plans to develop a country-specific HCV national interpretation document (FSC Spain, 2018). Both France and Portugal have an Annex to their national FM standards with guidelines for the identification and management of HCVs (FSC France, 2017; Bugalho and Santos, 2018) and Italy created a guidance document about the whole FSC national standard where the HCV approach is also explained in detail (FSC Italy, 2018).

All three national interpretation documents focus on defining HCVs within the corresponding national context and on offering information sources both for HCVs identification and management (FSC France, 2017; Bugalho and Santos, 2018; FSC Italy, 2018). An interesting difference amongst these countries is the presence of different HCV types: France interpretation disregards HCV2 in the country (FSC France, 2017) and Portugal had a debate about HCV5 presence and eventually it was identified only in one place of the country (Bugalho and Santos, 2018). On the other hand, Italia guidelines identify all six types of HCVs (FSC Italy, 2018). As regards similarities, both Italy and France guidance documents group HCV1 and HCV3 when giving the national interpretation and the national information sources.

Back to Portugal, a working group was created during the FSC National Standard development process to adapt the HCVs to the local context (Bugalho and Santos, 2018) and different indicators were developed at a national level to address the four Criteria within Principle 9, in order to support HCVF certification. The Portuguese National Interpretation of High Conservation Value Forests is available in Portuguese for consultation on the FSC Portugal website (FSC Portugal, 2020).

Single HCVs are presented in detail in the sub-sections reported below, providing a short description and delivering key concepts for understanding them.

2.1.2.1 HCV 1 - Significant concentration of biodiversity values

This value refers to areas with high concentration of species, including endemic species, rare species, threatened or endangered species, unusual assemblages of taxonomic groups and remarkable seasonal concentrations which are significant at global, regional or national level (Jennings et al., 2003; Brown et al., 2013; FSC Australia, 2013; Bugalho and Santos, 2018).

To qualify as HCV1 it is not mandatory to achieve a certain amount of biological diversity, as sometimes the presence of a single species can be important enough to identify the area as an HCV forest. This can be the case of species listed in the International Union for Conservation of Nature (IUCN) Red List or the National Protected Species list and that can be found in the area in a high enough concentration to be significant for the country (Brown et al., 2013).

Because of the complexity of biodiversity values, The High Conservation Value Forest Toolkit by Proforest (Jennings et al., 2003) defines four different elements to help identifying HCV 1. This approach is also followed in the HCVNI from FSC Portugal (Bugalho and Santos, 2018).

HCV1.1 - Protected or classified areas

Protected areas are essential for biodiversity conservation policies of most governments and many non-government organizations (NGOs) (Jennings et al., 2003). Despite the differences between countries, most protected areas share the aim to conserve nature and biodiversity, to ensure a sustainable use of natural resources and enhance international cooperation regarding conservation policies. In Portugal, this includes the National Network of Protected Areas (*Rede Nacional de Áreas Protegidas*, RNAP) and Natura 2000 areas, other classified areas related to international agreements, like the Ramsar Convention, and some non-classified areas like Important Bird Areas (IBA) (Bugalho and Santos, 2018). The protected areas topic is further explained in section 2.3.5.

HCV1.2 - Threatened and endangered species

Threatened or endangered species are one of the most important aspects of biodiversity value, and their presence increases the area importance regarding HCV, because these species are more vulnerable to habitat loss or other disturbances like hunting or pests (Jennings et al., 2003; Bugalho and Santos, 2018). FSC Portugal National Standard uses the IUCN Red List classification to identify threatened and endangered species to consider HCV1.2: IUCN critically endangered, endangered and vulnerable species fall within this category. HCV1.2 also includes species that might not be listed within the IUCN Red List but which are mentioned within conservation policies for Portugal, like the European Union Habitat and Birds Directives, the Convention on the International Trade of Endangered Species (CITES), the Berna Convention or the Bona Convention (Bugalho and Santos, 2018).

HCV1.3 - Endemic species

Endemic species are species that only exist in a particular geographic area. The most restricted this area is, the most conservation importance has the species, firstly

because it is more vulnerable to habitat changes and secondly because it is considered as a proof of really unique evolutionary processes (Jennings et al., 2003). Portugal has around thirty endemic species between plants, vertebrates and invertebrates, half of them are found in the continental area and half between the Azores and Madeira archipelagos (Bugalho and Santos, 2018).

HCV1.4 - Critical temporal use

Many animal species can use a variety of habitats at different seasons or at different stages in their life cycle (Brown et al., 2013). The habitats can be geographically different or just different ecosystems in the same region and their use can be seasonal or only in exceptional years. Nevertheless, all of them are critical to population survival. This HCV includes migration sites, breeding sites, migration routes or corridors and forests that have important seasonal concentrations of species (Jennings et al., 2003). These habitats can be key for their importance during breeding season or for the food availability in specific moments of the year (Bugalho and Santos, 2018). In temperate and boreal regions critical concentrations often occur seasonally while in the tropical ones the time might depend more on each species ecology (Brown et al., 2013). Overall, this HCV is included to ensure the conservation of important forest areas that are used only occasionally.

2.1.2.2 HCV 2 - Landscape-level ecosystems and mosaics

This value refers to large landscape-level forests and ecosystem mosaics that are significant at a global, regional or national level where there exist viable populations of most of the naturally occurring species (Brown et al., 2013, Bugalho and Santos, 2018) and where ecological processes are relatively unaffected. It can also include forests with important sub-populations of wide-ranging species even if these populations might not be viable in the long term (Jennings et al., 2003).

These kinds of forests are usually large and contiguous, even though they can contain some public road (FSC Australia, 2013), and they should be less affected by human activities in recent times than other forests of the region or country (Jennings et al., 2003). HCV2 gives value to these intact forest areas for their unusual size and their contribution to wilderness or landscape conservation (FSC Australia, 2013).

Because of their characteristics, these forests are usually really large, with areas of thousands or tens of thousands hectares (FSC Australia, 2013). In fact, one of the most widely used guidelines is an area threshold of 50 thousand hectares, a size related to maintaining populations viability (Brown et al., 2013). Despite that, size definition can be relative to each regional landscape context and because of this, expert consultations and the development of HCVNIs are necessary (Brown et al., 2013, FSC Australia, 2013). For example, in regions where native forests have been highly fragmented and converted, smaller areas of remaining natural forests should be taken into consideration (FSC Australia, 2013). Moreover, it is not necessary for the forest to be absolutely undisturbed to qualify for HCV2, it can happen for example that some species are locally missing (Brown et al., 2013).

The most used approach to assess HCV2 is to compare the FMU characteristics with native forests which have suffered minimal human intervention. Some characteristics to check can be forest communities, successional stages, structures or species composition and abundance (FSC Australia, 2013).

Examples of HCV2 in Portugal are provided by the *montado* agroforestry systems in the centre and south of the Country, especially with the presence of characteristic ecosystem species, like birds of prey. These forests are considered among the few with regional relevance at the Mediterranean basin level. However, not all *montados* are considered HCVF, as they need to comply with requirements about area continuity and conservation status (Bugalho and Santos, 2018).

2.1.2.3 HCV 3 - Ecosystems and habitats

This value is designed to maintain rare, threatened or endangered forest ecosystems, habitats, communities or refugia (Brown et al., 2013, Bugalho and Santos, 2018). The areas considered for this value need to have a certain level of threat or rare or unique species compositions (Brown et al., 2013). Some ecosystems are naturally rare because they exist under really limiting climatic or geological conditions, while other ecosystems become rare because they are threatened by human activities, specially processes like land conversion of natural ecosystems to other land uses like agricultural or forest plantations (Jennings et al., 2003).

This value includes mainly forest ecosystems which used to be typical of large regions and are currently heavily degraded or reduced, but it also includes rare associations of species without them needing to be in a threatened situation (Jennings et al., 2003). A key factor is the definition of rare ecosystems, which is made considering different criteria like size, age, structure or species composition. Besides this, the existence of similar ecosystems within the same region is also taken into account (Brown et al., 2013).

Some of the ecosystems included within this value in Portugal are the chestnut forests in Monchique mountains in the south of the Country or the temporal Mediterranean pools (Bugalho and Santos, 2018).

2.1.2.4 HCV 4 - Ecosystem services

This value defines areas that provide basic ecosystem services in critical situations, like provision of water or control of soil erosion (Brown et al., 2013; FSC Australia, 2013; Bugalho and Santos, 2018). Ecosystem services are the benefits that humans obtain from ecosystems, and some examples are provisioning services like food, timber or water; regulating services like floods, drought or land degradation control; supporting services like soil formation; and even cultural services like spiritual or recreational benefits (Brown et al., 2013).

Some of these ecosystem services can be considered critical when the interruption of the service provisioning can be a threat for local communities' welfare, important infrastructures functioning or other HCVs condition (Brown et al., 2013). The forests considered for HCV 4 are forests which alteration would very likely result in important impacts on the delivery of some ecosystem services (Bugalho and Santos, 2018).

As for HCV1, the High Conservation Value Forest Toolkit by Proforest (Jennings et al., 2003) divides HCV 4 in three subdivisions of ecosystem services: they are reported below.

HCV4.1 - Forests critical to water catchments

Forests around catchment areas have an important role in regulating the stream flow and water quality, or in preventing flooding episodes. HCVF for this value are usually

forests covering large parts of a catchment area or forests that exist in situations when the risk of disruptive events (flooding or drought) or the use of water are high.

HCV4.2 - Forests critical to erosion control

All areas suffer some degree of erosion and in most cases the consequences are not direct, except when the area affected by erosion, landslides or avalanches can pose risks on human life, productive land, human properties or ecosystems. In these situations, forests' role in controlling terrain stability is critical.

HCV4.3 - Forests providing barriers to destructive fire

Wildfires are a natural disturbance factor of many forest ecosystems, but as with the erosion control case, they can be an important threat for human life and property or for threatened ecosystems or species. As observed already for HCV4.2, this element considers forests that naturally act as a barrier in areas where wildfire consequences could be severe.

2.1.2.5 HCV 5 - Community needs

This value identifies areas that provide fundamental resources to meet the basic needs of local communities, like livelihoods, health, nutrition or water, amongst others (Brown et al., 2013; FSC Australia, 2013; Bugalho and Santos, 2018). It is important to point out that HCV5 focuses on protecting basic subsistence and security of local communities that get substantial and irreplaceable benefits from forests (Jennings et al., 2003).

Some examples of basic needs include provisioning of food, fuel, medicine or building materials; subsistence crops, traditional farming practices or unique sources of water for drinking or other survival uses (Bugalho and Santos, 2018). Forests become fundamental as resources in situations where the services provided cannot be obtained through other accessible and affordable alternatives (Brown et al., 2013, Jennings et al., 2003) and the degradation of forest could cause important negative consequences to local communities or affected stakeholders (Brown et al., 2013).

This value also considers employment, income and products obtained from the forests as elements that should be conserved as long as they do not negatively affect other

basic needs. However, this does not justify an unsustainable FM or an excessive use of traditional practices when these activities can degrade the forest or affect other important values present on it (Jennings et al., 2003).

Other forest uses like recreational hunting or commercial timber harvesting are not considered human needs (Bugalho and Santos, 2018), so they do not count as HCV. Forests providing useful but not fundamental resources or forests providing resources that could be obtained somewhere else or easily replaced are not considered as HCVFs (Jennings et al., 2003).

HCV5 is more likely to occur in areas where whole communities really depend on forests for their livelihoods and where there is limited availability of alternatives (Brown et al., 2013). This HCV was initially conceived for native communities which depend on forest resources for subsistence, a situation that does not exist in Portugal. Even though, during the development process of the HCVNI it was decided to keep this value to protect local communities which might be economically dependent on non-timber forest products like honey, mushrooms or grazing. These activities must be carried out in a sustainable way and only as long as they do not affect other HCVs in the forest (Bugalho and Santos, 2018).

2.1.2.6 HCV 6 - Cultural values

HCV6 definition includes a broad range of different elements, so in the Common Guidance for the Identification of HCV (Brown et al., 2013) two different categories are identified: they are described below.

HCV6.1 - Values of global or national significance

It englobes sites, resources, habitats or landscapes which have cultural, archaeological or historical significance at a global or national level. Usually, these sites are already recognized and have been designated by governments or international agencies like the United Nations Organization for Education, Science, and Culture (UNESCO). In the case of new sites of extraordinary significance being discovered or identified, they can also qualify as HCV6 before any official designation, based on experts and stakeholder consultation (Brown et al., 2013).

HCV6.2 - Values critical at local scale

This element protects the traditional culture of local communities where forest is critical to their identity because of its cultural, ecological, economic or religious/sacred importance (Brown et al., 2013; Jennings et al., 2003; Bugalho and Santos, 2018). The identification of areas hosting HCV6.2 is done through engagement with the local communities or indigenous peoples. Examples of these areas include religious, sacred sites and burial grounds which are known by the local people. In some cases, these areas are already protected by national laws (Brown et al., 2013).

2.2 Portugal context

2.2.1 Portuguese forests

Forests in Portugal have changed significantly over time due to strong human intervention across centuries. The continental land of Portugal reached the country's highest level of deforestation in the XVIII century (Agestam and Nilsson, 2017), due to the intensive wood consumption for fuelwood and for building ships (Reboredo and Pais, 2014). Nevertheless, during the second half of XIX century, Portugal carried out plantation programs that helped reversing the forest cover decline (Agestam and Nilsson, 2017).

In 1874 the first national forest inventory was performed, that showed a forest area of 0.64 million ha, which corresponds to 7% of the country (Uva, 2015) (Figure 1). These results exhibited the status of forests in mainland Portugal, that was practically deforested. Between 1875 and 1995, forested area in mainland Portugal increased significatively, reaching its highest value of 3.3 million ha, which corresponds to 37% of the total mainland area (Agestam and Nilsson, 2017). Afterwards, during the 1995-2010 period, there was a 0.14 million ha decrease in forest area, corresponding to a -0.3% variation per year (Uva, 2015). This forest area decrease is considered to be related to frequent and intense wildfires (Borges et al., n.d.) and it was especially noticed in the northern and central regions of the country (Nunes et al., 2019a). The results from the Sixth National Forest Inventory (IFN6) show that this loss tendency has reverted between 2010 and 2015, with an increase of 60,000 ha, that equals to a 1.9% increase of the total forest area (Uva et al., 2015).

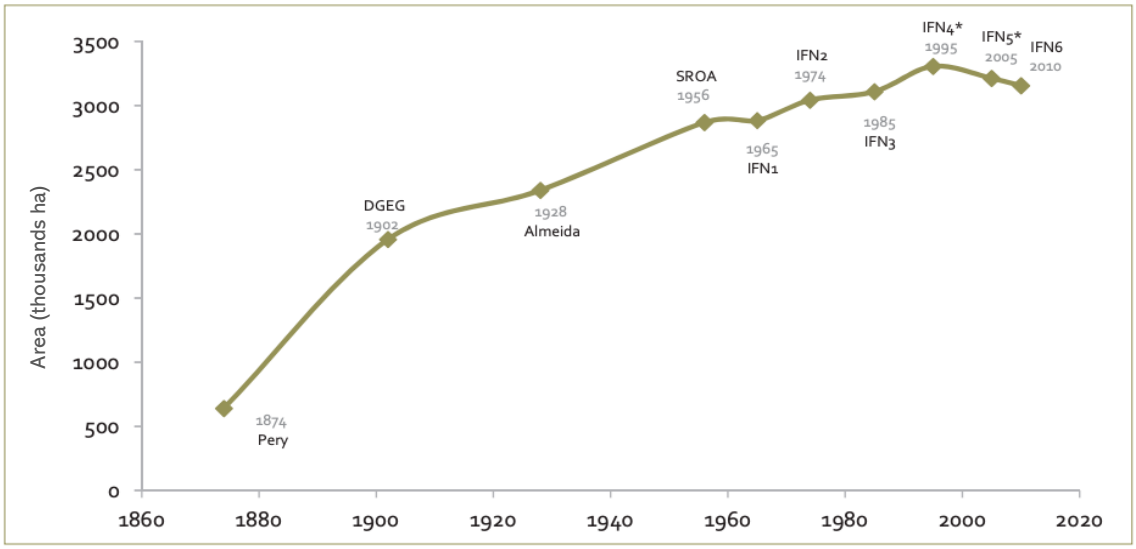


Figure 1: Historic evolution of Portuguese forests between 1874-2010 (Uva, 2015)

According to data presented in the 2015 final report for the IFN6, Portugal has around 3.2 million ha forest area, accounting for 36% of total land area (Uva et al., 2015). These numbers make forest cover the main land use for Portugal (Agestam and Nilsson, 2017), followed by scrub forest with 31% and agriculture land with 23,5% (Figure 2) (Uva et al., 2015). Portugal is the eighth country in the European Union with the highest forest cover by surface area (Valente et al., 2015) and falls within the average national forest cover percentage value for the 27 European Union countries (Forest Europe, 2015).

Portugal has different forest types distributed longitudinally. In the South, the main type of forest areas is the *montado* agroforestry systems (Borges et al., n.d.), which account for around 1 million ha (Uva et al., 2015). They are multifunctional forests that combine cork oak and holm oak with agriculture and grazing activities (Borges et al., n.d.), and for which the main productive activity is not timber production (Uva et al., 2015).

In the North and Central regions forest consist mainly of pure or mixed conifer and eucalypt stands (Borges et al., n.d.). Most Portuguese forests are mainly planned for production functions, from roundwood to pulpwood and other non-wood forest products (Kardell et al., 1986) (Figure 3). Conifer stands account for around 1 million ha. The above-reported decrease of conifer stand during the 1995-2010 period was mostly due to the loss of Pinus pinaster stands caused by wildfires and plagues.

Differently, eucalypt stands account for 0.845 million ha and have been increasing systematically during the last 50 years (Uva et al., 2015).

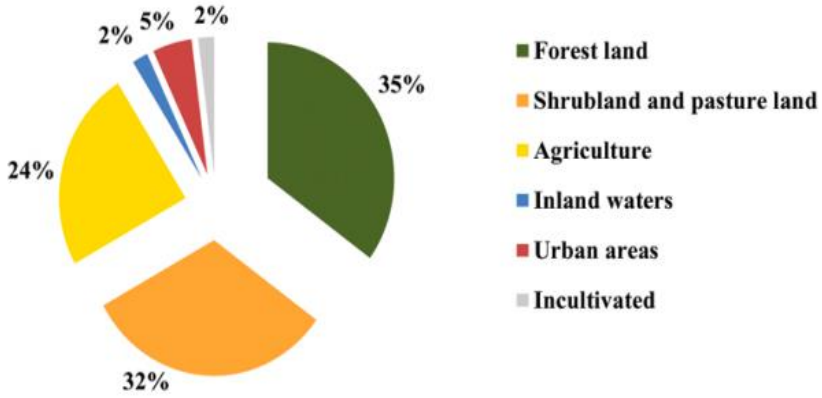


Figure 2. Land use classes for mainland Portugal (2010) (Valente et al., 2015)

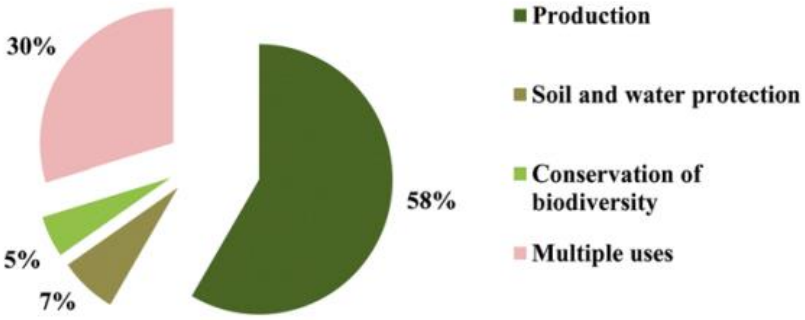


Figure 3. Primary functions of Portuguese forests (Valente et al., 2015)

2.2.2 Forest ownership

Portugal forest ownership structure looks quite different if compared to other European countries (Figure 4), with about 85% Portuguese forest being private owned (Agestam and Nilsson, 2017). This includes forest owned by both industrial and non-industrial private forest owners (Feliciano et al., 2015). Non-industrial group includes small scale forest owners. The state owns only 2% of the forests and the rest is communal land, known as *baldios* (Nunes et al., 2019b), which covers about 14% of the total forest area (Pereira, 2016). Public forests can be owned at national, regional or municipal level (Feliciano et al., 2015). About 70% of private forests qualify as smallholding, i.e. single areas covering less than 4 ha, while only 1% of the owners own areas totalling 100 ha or more (Borges et al., n.d.).

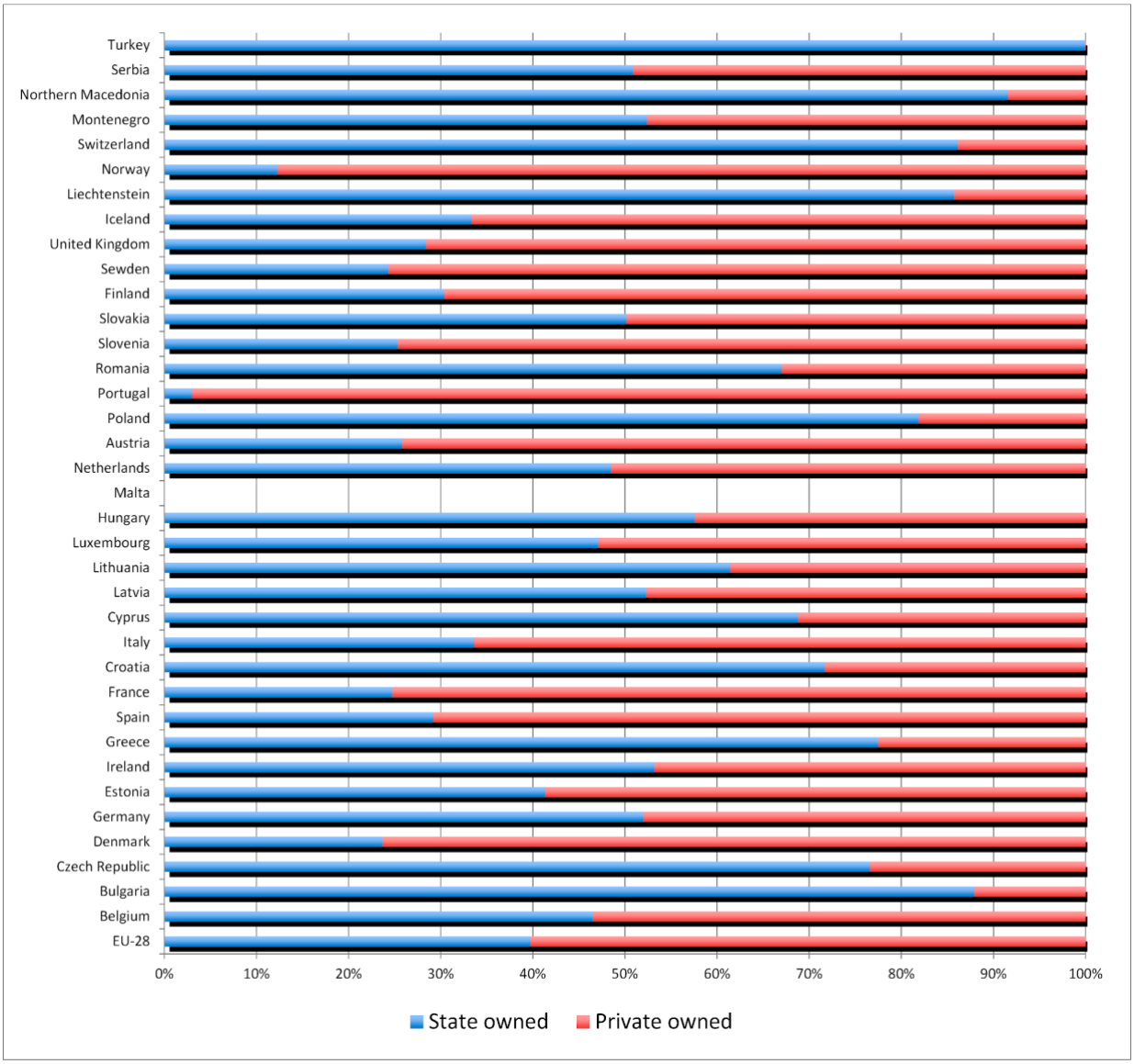


Figure 4: Distribution (%) of ownership of forest property in European countries (adapted from EUROSTAT, 2018). (Nunes et al., 2019b).

Regarding nature conservation, 19% of the continental Portugal forest area is integrated in the national conservation areas network, while 23% of the forest area is part of the Natura 2000 European network (Pereira, 2016).

Portuguese forests can be classified in two main and quite different land ownership structures (Baptista and Santos, 2005). In the Northern and Central Portugal regions most forest holdings are small-scale forests, mainly pine or eucalyptus forests covering less than 1ha (Feliciano et al., 2015; Agestam and Nilsson, 2017). On the other side, Southern regions of the country have larger forest holdings, with properties

of more than 100 ha, and the main forest are the *montados* agroforestry systems, composed by cork oak as the main tree species (Pereira, 2016).

Forests with communal ownership are mostly found in the Northern and Central regions of Portugal and are managed by national and regional public forest agencies (Pereira, 2016). With this system, tree ownership is shared between the communities (around 60-80% of the tree revenues) and the forest agencies (20-40% of tree revenues) (Feliciano et al., 2015).

In the Northern and Central regions of Portugal, forests are usually characterised by low profitability and the land tenure is heterogeneous and highly fragmented (Borges et al., n.d.). FM is influenced by the proximity of the forests to the communities, which leads to a family type of forest work. Moreover, around 47% of the smallholders are over 70 years old and carry out a limited amount of silviculture practices (Agestam and Nilsson, 2017). This kind of FM is at risk according to Novais and Canadas (2010), as forest owners are old and family labour in Portugal is decreasing.

Finally, it is important to add that the Portuguese cadastre of forest holdings is really limited: it only covers around 50% of the national territory, mostly with reference to the Southern region of the Country (Feliciano et al., 2015). This implies that Northern and Central regions largely lack official and reliable information about land ownership.

2.2.3 Main forest tree species

Portugal is one of the European countries with the highest biodiversity because of its privileged location, that allows the coexistence of two climates: the Atlantic and the Mediterranean ones. However, the country forests have experienced high human intervention over centuries, so their structure and species composition have changed significantly over time (Nunes et al., 2019a).

Currently, there are three major forest tree species in Portugal: *Quercus suber*, *Pinus pinaster* and *Eucalyptus globulus* (Agestam and Nilsson, 2017; Borges et al., n.d.; Uva, 2015) and the three of them together represent almost 75% of the forest area (Nunes et al., 2019a). Figure 5 displays the area distribution of the main tree species

in Portugal, showcasing the predomination of the three major tree species over the other common species. The main three tree species are also the ones used in the dominant forest industrial sectors in Portugal: pulp industry, wood agglomerates, biomass pellets and cork industry (Uva et al., 2015).

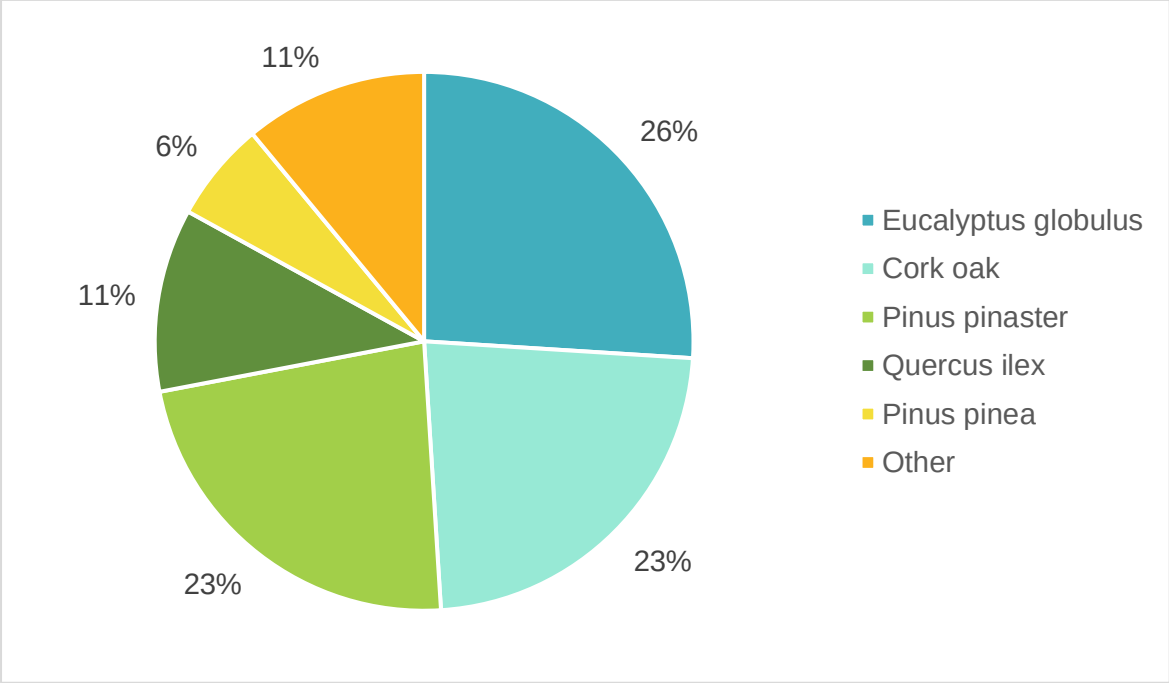


Figure 5. Percentages of Forest Tree Species Area in Portugal (Agestam and Nilsson, 2017; Borges et al., n.d.; ICNF, 2013)

The most significant change in forest area in the last decades is the decline of *Pinus pinaster*, which decreased by about 0.24 million ha between 1995 and 2010 (Nunes et al., 201a), a loss of 13% of the forest area (Agestam and Nilsson, 2017; Borges et al., n.d.). This reduction was due to changes of land use or cover, like changes to shrubs cover, to eucalypt stands, to urban areas or simply planting other tree species (Agestam and Nilsson, 2017; Borges et al., n.d.). Despite this decline, *Pinus pinaster* is still an important tree species in Portugal for timber industry, so it is necessary to develop management practices or policies that are able to ensure the species recovery (Nunes et al., 2019b).

Contrarily, *Eucalyptus globulus* plantations increased by about 95 thousand ha during the same period of time when pine stands declined (ICNF, 2013). Eucalyptus genus has more than 500 different species, most of them being natural of Australia and Tasmania. *Eucalyptus globulus* was introduced in Portugal in 1839 (Kardell et al., 1986), however it was not before the 1950-1960s that eucalypt plantations expanded

over Portugal, starting first in the south as a response to the cereal crisis (Feliciano et al., 2015), but moving soon to the north were it easily substituted maritime pine stands which were highly affected by wildfires (Fernandes, 2008).

2.2.4 Forest sector

The forest sector in Portugal is of significant importance, as it represents 2% of the national Gross Domestic Product (GDP) (Nunes et al., 2019b), i.e. a value larger than the average one observed for the European Union. Only in Finland and Sweden the forest sector shows a higher contribution to the national GDP than in Portugal (Louro et al., 2014).

Forests are the basic green infrastructures of a sector that contributes with 2.6 billion euro to the national trade balance (Nunes et al., 2019b) and generates around 115 thousand direct jobs (ICNF, 2017b), considering also wholesale and retail trades (Louro et al., 2014). Forest sector employment is higher in coastal areas due to the presence of the wood processing industry, but it is also important in other areas of the territory like rural inland regions as a way to mitigate their structural economic weaknesses (Louro et al., 2014).

Forest products trade represents around 10% of the Portuguese exports. Most of it consists of trade in transformed products, such as those derived from cork or bleached pulp (Nunes et al., 2019b), with only 2% of the trade being forestry products, logging or related services (ICNF, 2019).

In Portugal there are four historic forest-based production and value chains, which are wood for furniture and construction, wood for pulp, wood for paper and cork (Louro et al., 2014). Cork industry accounts for around one third of the forest product exports value. In 2018 there were 685 companies operating within this sector and creating 8 thousand direct jobs. The sector with the second highest exports (5%) is the pulp and paper industry, which contributes to about 4 thousand direct jobs (Nunes et al., 2019b).

2.2.5 Other forest conservation tools in Portugal

Portugal has a protected areas system called National System of Classified Areas (*Sistema Nacional de Areas Classificadas*, SNAC), that englobes the RNAP, the Natura 2000 Network and other classified areas assumed under international agreements by the Portuguese government, like Ramsar sites or Biosphere reserves (Agência Portuguesa do Medioambiente, 2018; ICNF, 2020).

The SNAC was developed in 2008 and currently, the sum of National Protected Areas and Natura 2000 Areas covers over 20% of the Portuguese national territory (Bugalho and Santos, 2018), with Natura 2000 being the most common facies and greatly overlapping with RNAP areas, as it is shown in Figure 6 (Agência Portuguesa do Medioambiente, 2018).

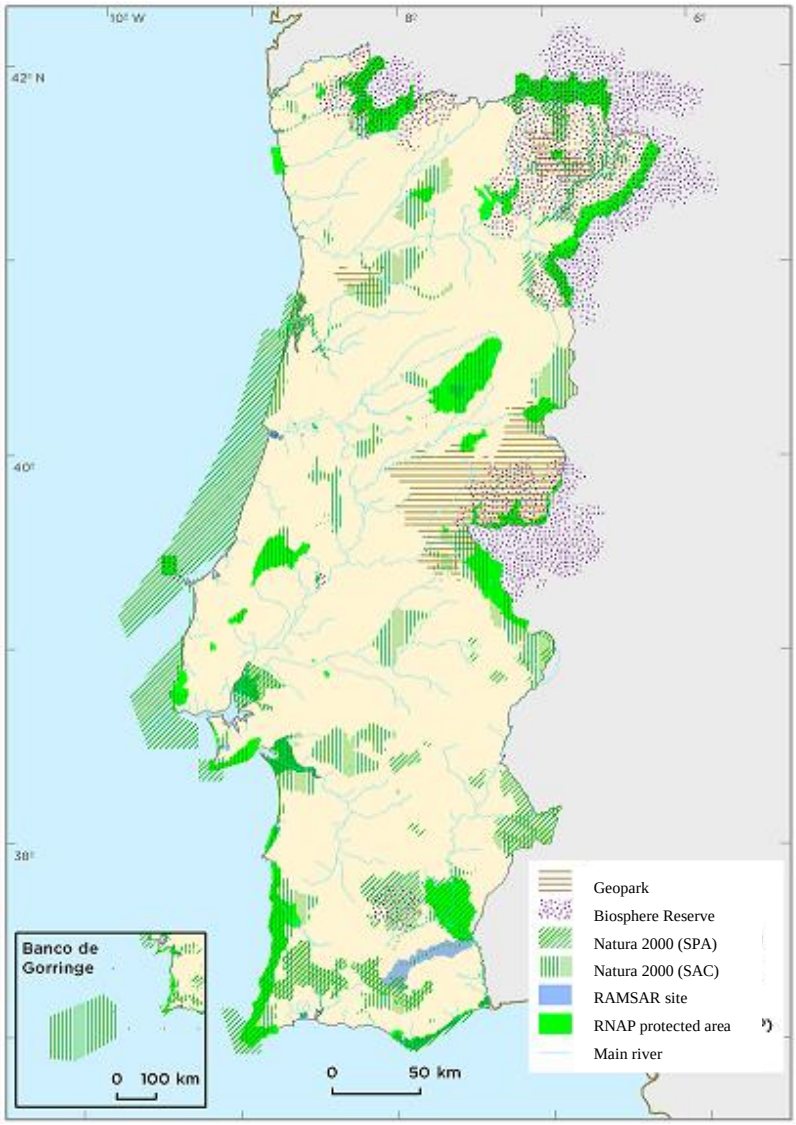


Figure 6. SNAC areas in Protected areas in Portugal (Adapted from ICNF, 2016)

2.2.5.1 National Protected Areas Network

The RNAP includes terrestrial, land-aquatic or marine areas which have important biodiversity or natural characteristics with scientific, ecologic, uniqueness, social or landscape values. These areas shall be managed in specific ways in order to ensure a long-term sustainable use of their resources as well as their conservation and value (ICNF, 2020).

There are different typologies of protected areas: National Park, Natural Park, Natural Reserve, Protected Landscape, Natural Monument (Landovsky and Mendes, 2010; Agência Portuguesa do Medioambiente, 2018). The areas classified as protected get legal protection to ensure their biodiversity conservation and ecosystem services provision, besides the geologic patrimony conservation (ICNF, 2020). Protected Areas can have national, regional, local and even private scope. Autonomous Regions can also identify protected areas in all the previous categories except for the National Park one (Agência Portuguesa do Medioambiente, 2018). SNAC includes the Regional Protected Areas Networks (for Azores and Madeira Autonomous Regions), but the inclusion of the Regional Protected Areas to the RNAP is decided in each case by the national authority.

Currently, RNAP includes 48 Public Protected Areas and 1 Private Protected Area, in continental land. The Network covers some 0.74 million ha of terrestrial land and 53 thousand ha of marine land (Figure 6) (Agência Portuguesa do Medioambiente, 2018).

National Scope

National Park
1 Peneda-Gerês

Natural Park
2 Montesinho
3 Litoral Norte
4 Alvão
5 Douro Internacional
6 Serra da Estrela
7 Tejo Internacional
8 Serras de Aire e Candeeiros
9 Serra de São Mamede
10 Sintra-Cascais
11 Arrábida
12 Sudoeste Alentejano e Costa Vicentina
13 Vale do Guadiana
14 Ria Formosa

Natural Reserves
15 Dunas de São Jacinto
16 Serra da Malcata
17 Paul de Arzila
18 Berlengas
19 Paul do Boquilobo
20 Estuário do Tejo
21 Estuário do Sado
22 Lagoas de Santo André e Sancha
23 S.C.Marim – V.R.S.António

Protected Landscapes
24 Serra do Açor
25 Arriba Fóssil da Costa da Caparica

Natural Monuments
26 Cabo Mondego
27 Portas de Ródão
28 Pegadas de Dinossáurios de Ourém/Torres Novas
29 Carenque
30 Pedra de Mua
31 Lagosteiros
32 Pedreira do Avelino

Regional/local scope – DL 19/93

Protected Landscape
33 Albufeira do Azibo
34 Como do Bico
35 Lagoas de Bertiandos e São Pedro de Arcos
36 Serra de Montejunto

Regional/local scope – DL 142/2008

Regional Natural Park
37 Vale to Tua

Local Natural Reserve
38 Paul da Tomada
39 Estuário do Douro

Regional Protected Landscape
40 Litoral de Vila do Conde e Reserva Ornitológica do Mindelo
41 Serra da Gardunha
48 Parque das Serras do Porto

Local Protected Landscape
42 Açude da Agolada
43 Açude do Monte da Barca
44 Rocha da Pena
45 Fonte Benémola
47 Serras do Socorro e Archeira

Private scope

Private Protected Area
46 Faia Brava

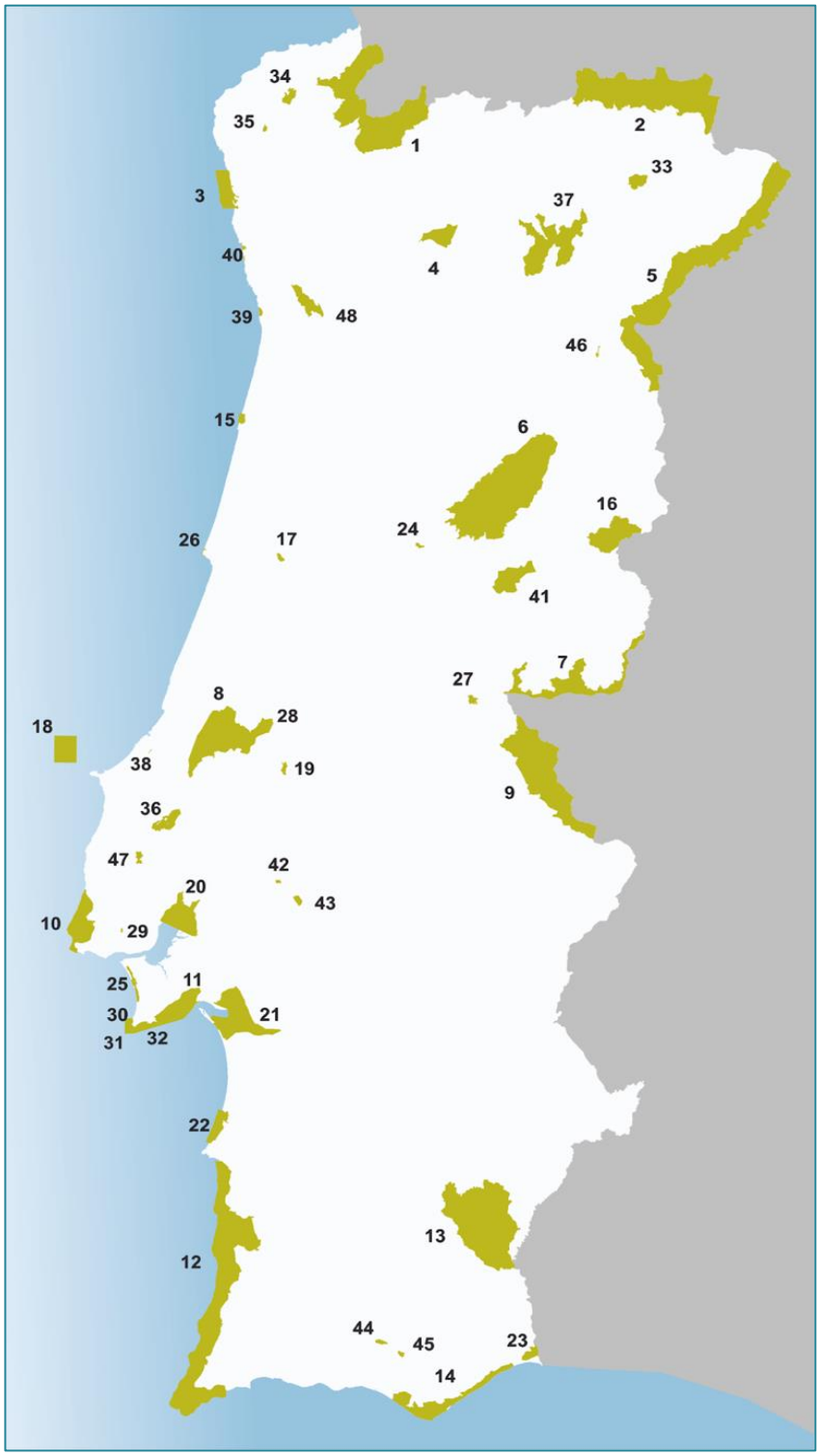


Figure 7. RNAP areas across Portugal (Adapted from ICNF, 2020b)

2.2.5.2 Natura 2000 Network

The Natura 2000 Network is the main nature conservation tool of the European Union and consists of an ecologic network of protected areas with the aim to ensure biodiversity conservation through the protection of the most vulnerable species and habitats in Europe (Landovsky and Mendes, 2010; ICNF, 2016). These protected

areas can host human activities, but these need to be managed in ecologically, economically and socially sustainable manners (ICNF, 2016; Agência Portuguesa do Medioambiente, 2018). Natura 2000 is the largest coordinated network of protected areas in the world and it spans across all European Union countries, covering around 18% of European Union land area and almost 6% of marine territory (European Comission, 2020).

The Natura 2000 Network includes different types of areas, created under two European Directives: the Birds Directive (nº. 79/409/CEE) and the Habitats Directive (nº. 92/43/CEE) (Landovsky and Mendes, 2010; ICNF, 2016). Under the Birds Directive Special Protection Areas (SPAs) were established, with the objective to conserve threatened bird species and their habitats (ICNF, 2016). Special Areas of Conservation (SACs) were created under the Habitats Directive with the aim to protect threatened habitats and species from all around Europe (ICNF, 2016; Agência Portuguesa do Medioambiente, 2018; European Comission, 2020).

The Natura 2000 Network in Portugal covers 2.58 million ha of land plus 3.9 million ha of marine areas (Agência Portuguesa do Medioambiente, 2018), with protection categories (SPA, SAC) overlaying in most of them (Landovsky and Mendes, 2010). Considering continental Portugal and the Autonomous Regions (Azores and Madeira), Natura 2000 Network in Portugal consists of 107 areas under the Habitats Directive and 62 SPAs under the Birds Directive (Agência Portuguesa do Medioambiente, 2018).

3. Research methodology

3.1 Research approach

In order to examine the contribution of the FSC HCV approach to conservation in Portugal and achieve the research objectives defined in chapter 1 (see 1.2), different methodological approaches were adopted.

Overall, this study methodology can be considered as experimental, as for now there are not standardized methods to assess HCV impacts in conservation. For this reason, most of the methods adopted were taken from other studies and adapted to the HCV approach in Portugal. Upon careful analysis of the forest certification impacts studies (Cubbage et al., 2010; Moore et al., 2012), it was decided to rely on a mixed methodological approach. More into detail, a literature review was performed alongside the use of a questionnaire survey approach. Quantitative and qualitative data from both primary – e.g. surveys carried out to certificate holders - and secondary sources - e.g. audit reports, FSC standards and Portuguese as well as European normative documents – were collected and analysed. More detailed information is provided below.

3.2 Study area

The study was conducted in Portugal, focused on the 21 FSC certified areas hosting HCV. For most of this study, only HCV certificate holders were taken into consideration, except for results reported in 4.1.1, for which reference was made to the total number of FSC certificate holders in Portugal.

Table 1 summarizes information on the Portuguese FSC certificate holders with reference to various key-characteristics of the forest areas included within the scope of their certificates, such as the type of certificate (group or individual), SLIMF (Small and Low Intensity Managed Forests) designation, type of ownership and certified area size, amongst others. Figure 8 shows a visual summary of some of the key characteristics. Around 76% of certificate holders are private forest owners/managers and about 62% of the certificate holders hold a group certificate – totalling some 1636

group members - while the remaining 38% hold single certificates. SLIMF designation shows a similar distribution with 33% of the certificates having no SLIMF designation and 67% having SLIMF areas within the scope of their certificate, either small (5%) or low-intensity (14%) with another 48% consisting of mixed - i.e. SLIMF and non-SLIMF - group certificates (48%). There are no groups consisting solely of members eligible for SLIMF requirements. In this document, certificate holders are referred as organizations and followed by their ID, but Annex 1 reports a full list of the certificate holders, including their names.

Table 1. Characterization of FSC certificate holders in Portugal.

OrgID	CertType	Memb	SLIMF	Ownership	Management	Area (ha)	Area class	Main area class
1	Group	240	Mixed group	Private	Private	8206,00	Mixed	<500
2	Group	116	Mixed group	Private	Private	42199,53	Mixed	<500
3	Group	10	Non-SLIMF	Private	Private	13399,69	Mixed	500-1000
4	Group	6	Mixed group	Private	Private	8513,60	Mixed	NA
5	Single	NA	Non-SLIMF	Private	Private	81699,85	>10000	NA
6	Group	37	Mixed group	Private	Private	23291,01	Mixed	<500
7	Group	161	Mixed group	Private	Private	14799,69	Mixed	<500
8	Group	76	Mixed group	Private	Private	44662,00	Mixed	<500
9	Group	239	Mixed group	Mixed	Private	2850,71	Mixed	<500
10	Single	NA	Low-intensity	Public	State	955,12	500-1000	NA
11	Single	NA	Non-SLIMF	Public	State	3707,00	1000-10000	NA
12	Single	NA	Low-intensity	Private	Private	994,50	500-1000	NA
13	Single	NA	Non-SLIMF	Private	Private	2836,19	1000-10000	NA
14	Group	1	Non-SLIMF	Private	Private	3920,07	1000-10000	NA
15	Group	11	Low-intensity	Private	Private	4461,99	Mixed	<500
16	Group	48	Mixed group	Private	Private	22493,06	Mixed	<500
17	Single	NA	Non-SLIMF	Private	State	8907,00	1000-10000	NA
18	Single	NA	Non-SLIMF	Private	Private	110107,00	Mixed	<500
19	Single	NA	Small	Public	State	488,73	<500	NA
20	Group	4	Mixed group	Private	Private	3240,85	Mixed	<500
21	Group	687	Mixed group	Mixed	Mixed	19641,51	Mixed	<500

Table columns are summarized and explained in the following legend:

- OrgID: Organization ID
- CertType: certificate type, it can be Group or Single.
- Memb: number of members for Group certificate. Not Applicable (NA) in Single certificates.
- SLIMF: SLIMF designation, classified as: Non-SLIMF, Small, Low-intensity, Mixed group.
- Ownership: forest ownership type, it can be Public, Private or Mixed.
- Management: FM type, it can be State, Community, Private or Mixed.
- Area: total area of the certified forest, in hectares.
- Area class: FMU areas classification under the categories <500ha, 500-1000ha, 1000-10000ha, >10000ha and Mixed.
- Main area class: most common area class in Mixed Area class groups, considering it the one with more than one third of the FMUs. It is NA in cases where Area class is not Mixed.

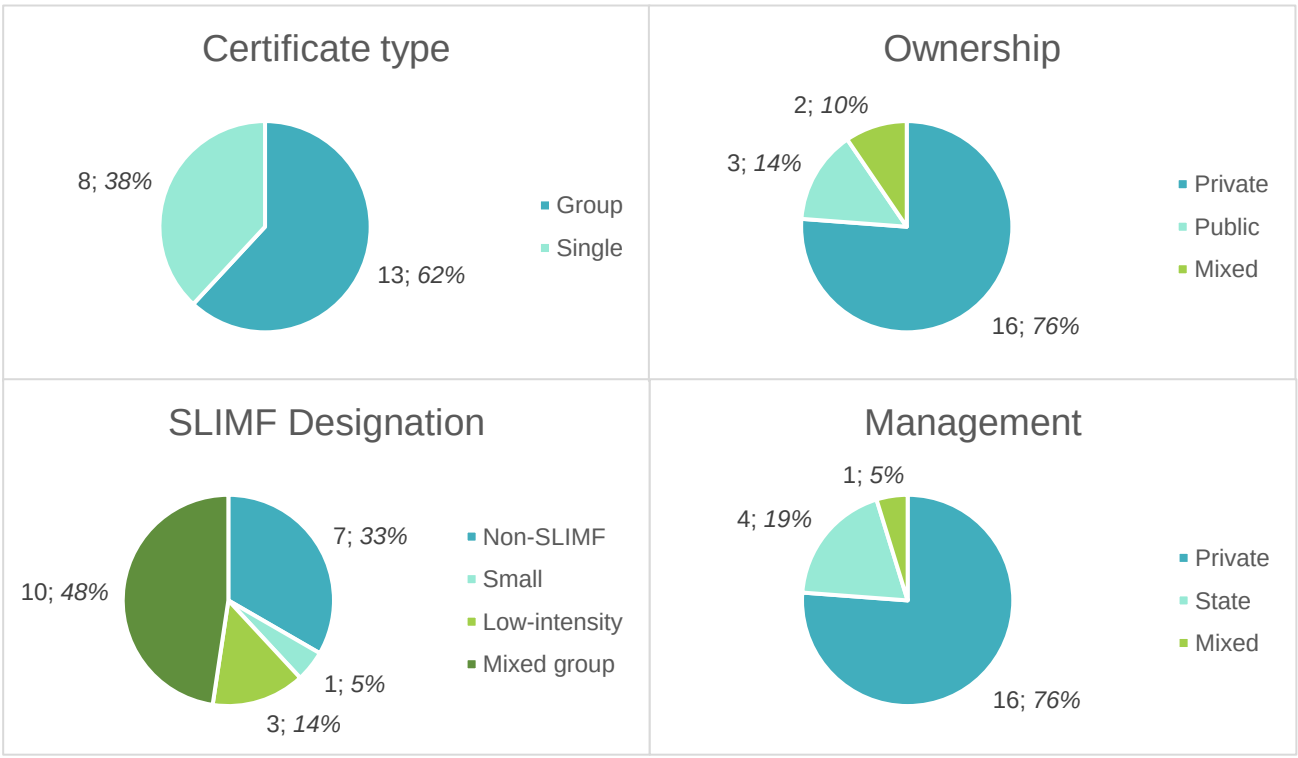


Figure 9. Visual summary of certificate holder characteristics based on the certification reports. Percentage values refer to number of certificates regardless of their size. Categories follow the same structure as in Table 1.

3.3 Data collection

3.3.1 Primary data

Primary data was collected through an electronic survey targeted at certificate holders. The survey structure and questions were designed following the examples of similar surveys performed in South (Cubbage et al., 2010) and North America (Moore et al., 2012). The initial draft survey was revised by FSC Portugal staff and then translated into Portuguese.

The questionnaire consists of 17 open-ended, multiple-choice and rating scale questions aimed to collect both quantitative and qualitative data. It covers organizational background information and specific topics like protected areas presence as well as changes to management practices, advantages and disadvantages perceived by the certificate holders. After basic information about the organization (name and contact person), the survey starts with asking about changes related to the adoption of an HCV approach for the aims of implementing FSC certification where respondents had to rate changes done in each activity area. Then,

the central part of the survey presents different open-ended questions about the definition of the HCV concept, presence of HCVs within the certified area, perception of HCV approach as a challenge for application in the organization and HCV importance in forest management plan (FMP) development. The last part of the survey was focused on the advantages and disadvantages of the HCV approach. Finally, there were two more open-ended questions about the presence of other conservation tools within certified areas and other conservation projects related to the present HCVs.

The survey was circulated among certificate holders via e-mail and was to be answered within a 10-day period, followed by a second e-mail reminder to the certificate holders who had not answered. One week later, a third and last e-mail was sent to the ones who failed to complete the survey. The ones who failed to answer the survey were considered to calculate the response rate.

Respondents were offered and sent a summary once the results were compiled and analysed. The survey is available for further consultation in Annex 2.

3.3.2 Secondary data

Secondary data was collected from the Public Summary Audit Reports for certified organizations with HCV in their areas as of February 2020. These reports were provided by FSC Portugal and were analysed in detail to develop different summary tables and carry out descriptive analysis functional to further elaborations regarding:

- Summary information on single certificate holders, organised into Table A1, Annex 1, and used as an informative basis for section 3.2;
- Presence/absence and size (area in ha) of each HCV class per certificate (Table A2). Due to inconsistencies in the reporting, a methodology had to be developed to fill area information gaps: for reports where no HCV forest area was specified, the total FMU area is assumed to be HCVF, always considering the smallest unit (i.e. member FMU in group certificates). It is also important to highlight that some areas contain more than one HCV, in this case, the forest area is accounted for in the different HCVs categories, but is only accounted once when computing the total HCV area, in order to avoid double accounting. Because of the lack of area data for HCV6, the total HCV area reported in

organization 18 is considered to be smaller than in reality. Information reported within this table was then used to develop section 4.1.2;

- Summary of HCV data. For each different HCV attribute, the number of reports was counted, identifying it, as well as the number of value entries in the total amount of reports (Table A3 and Section 4.1.3). The HCV entries reporting is not standardized amongst the reports, so, some reports considered one entry per attribute without specifying how many areas are present while some others have a different entry per each attribute presence per area. Therefore, number of entries was not considered for further analysis;
- Analysis and recompilation of the non-conformities (NC) included in the reports (Table A4 and Section 4.2.1.). This analysis was made with the aim to identify whether organizations apply FSC Principle 9 correctly or if NC are detected with reference to it. Only Corrective Action Request (CARs) with Minor and Major grade and referring to the FSC Principle 9 were considered. Observations were not considered for this analysis.

3.4 Data analysis

Data was mostly analysed using Microsoft Office Excel to carry out exploratory data analysis. Secondary data from the audit reports was summarized in bar charts and pie charts to display the distribution of categorical variables, i.e. the HCV class or the NC related to HCV. HCV attributes data was summarized in a table and also displayed in graphs.

For primary data obtained through the survey, descriptive statistics were computed to estimate general results and data was summarized in pie charts and boxplot charts. Data distribution of the survey responses was described using measures of central tendency (median and mean) and measures of variability (standard deviation), which were summarized in tables for each section.

Regarding objective 3, a one-way Analysis of Variance (ANOVA) test was carried out to analyse the survey results significance regarding differences between social, environmental and economic categories and also between advantages and

disadvantages. The distinction into the social, environmental and economic categories was done following the same criteria adopted for HCV assessment in North America (Moore et al., 2012). The confidence level for the statistical analysis was 95%. Outliers were identified before the analysis but were finally included because of the small sampling size and because they were not considered data reporting errors.

3.5 Limitations

The weak points of this methodology are identified mostly with regard to the reliance on secondary data with no previous standardization, that leads to uneven information availability and may affect the data analysis. This kind of study in principle could benefit from primary data collection from field data collection, but for technical constraints - including limitations due to Covid-19 restriction measures - this option was not considered.

Despite above-mentioned limitations, adopted methodologies allowed for a first analysis of the HCV situation in Portuguese certified forests and can be used as a first step towards improved assessments and a starting point for further data reporting standardization.

4. Results

4.1 HCV identification in Portuguese FSC certified areas

The first objective of this study was to summarize and describe the state of the art of HCVs within the framework of FSC certification in Portugal. The following paragraphs allow for a quick view of the presence of HCVs in Portugal and their distribution per types amongst the certificates, as well as identifying which natural or cultural values are being conserved under this approach in Portugal.

4.1.1 HCV presence within FSC certified forest areas in Portugal

Based on data available within Public Summary Audit Reports, 21 of the 34 FSC FM certificates, i.e. 62% of the total number of certificates, have at least one HCV in their scope (Figure 9a). When accounted in terms of area, however (Figure 9b) this certificates only account for 6% of the total FSC certified forest in Portugal.

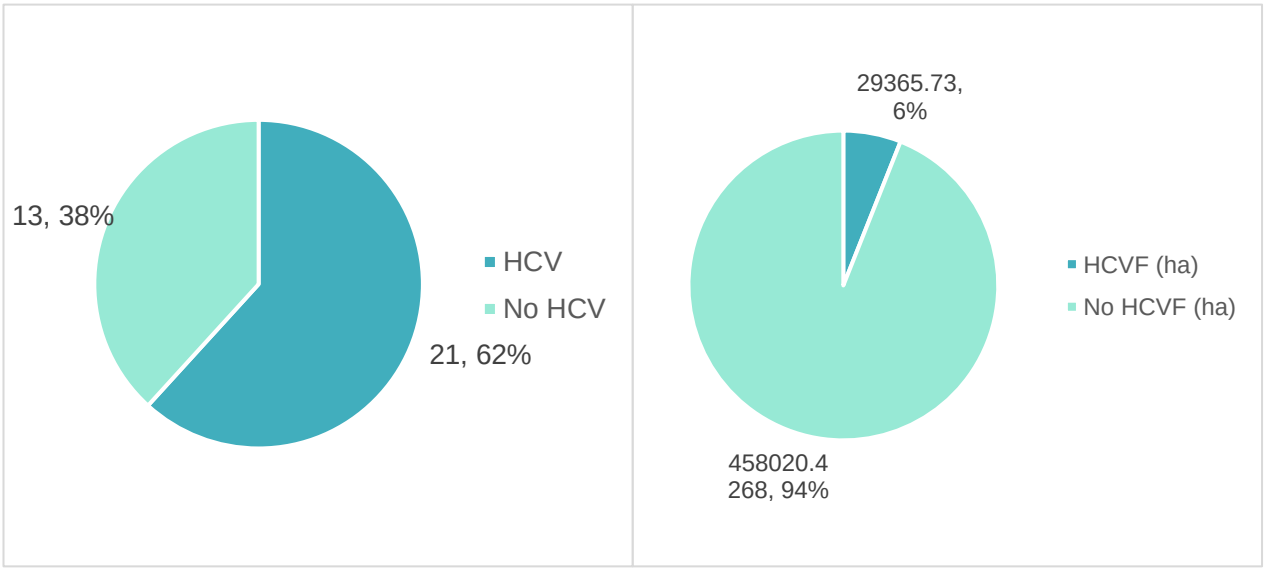


Figure 10. 9a (left): Percentage of FSC certificates with and without HCV in Portugal. 9b (right): HCVF area (ha) compared to certified forest with no HCVF designation.

4.1.2 HCV type abundance

The distribution of different HCV types per certificate is reported below. For this evaluation, one certificate had to be excluded because there was no designation of

HCV class in the corresponding report. For this reason, this section shows data from 20 certificates instead of 21.

Figure 10 shows the distribution of the different HCV types. HCV1 is by far the most common type and HCV4 and HCV5 the less common ones. HCV6 area does not correspond to HCV6 number of entries, which is explained by the fact that organization 18 identified 13 cultural attributes but did not report their area. It is also important to highlight that HCV5 is only present in one certificate, corresponding to the São Miguel Island Regional Forests of Azores, managed by organization 11.

Figure 11 shows more in detail the distribution of identified HCV1 values as they are reported within the reports. As previously explained in section 2.1.2.1, HCV1 values can be distinguished into 4 sub-categories. Chart reported in Figure 11 cannot be considered as a strict representation of the real HCV1 distribution, rather as an example of the differences in recording HCVs under FSC certification. In fact, of the 16 certificates with HCV entries in their scope, only 3 had entries for each HCV subcategory. Two out of these three certified organizations own and manage public forest areas.

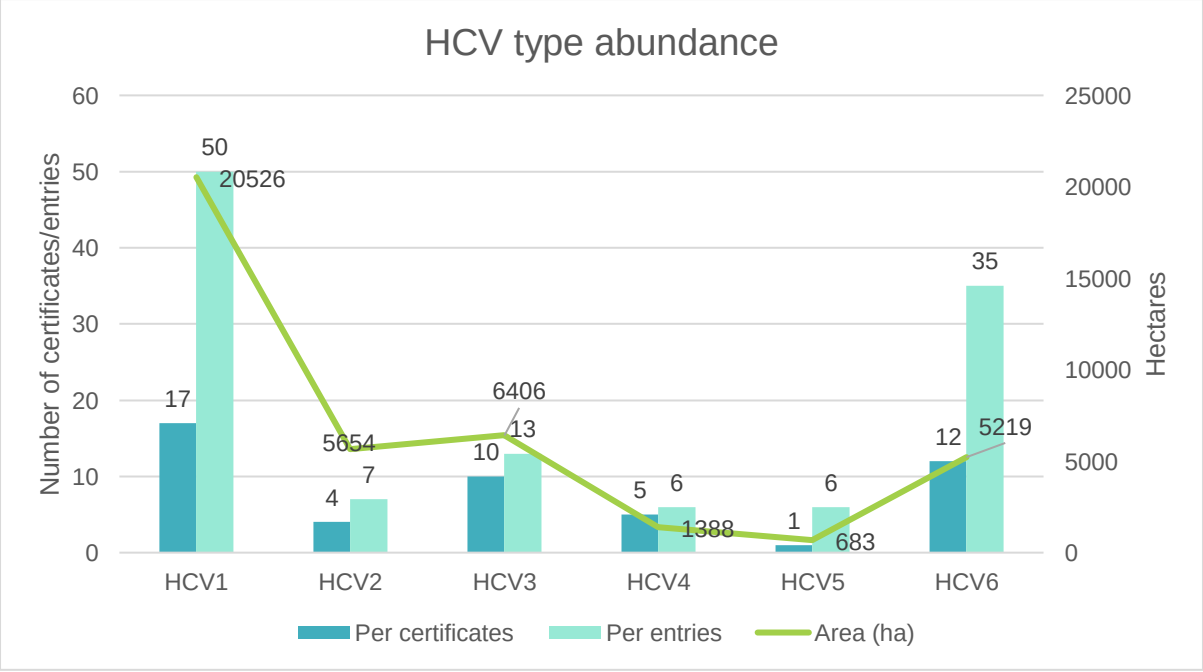


Figure 11. HCVF type abundance in terms of: abundance per certificate, abundance per entries and forest area (ha).

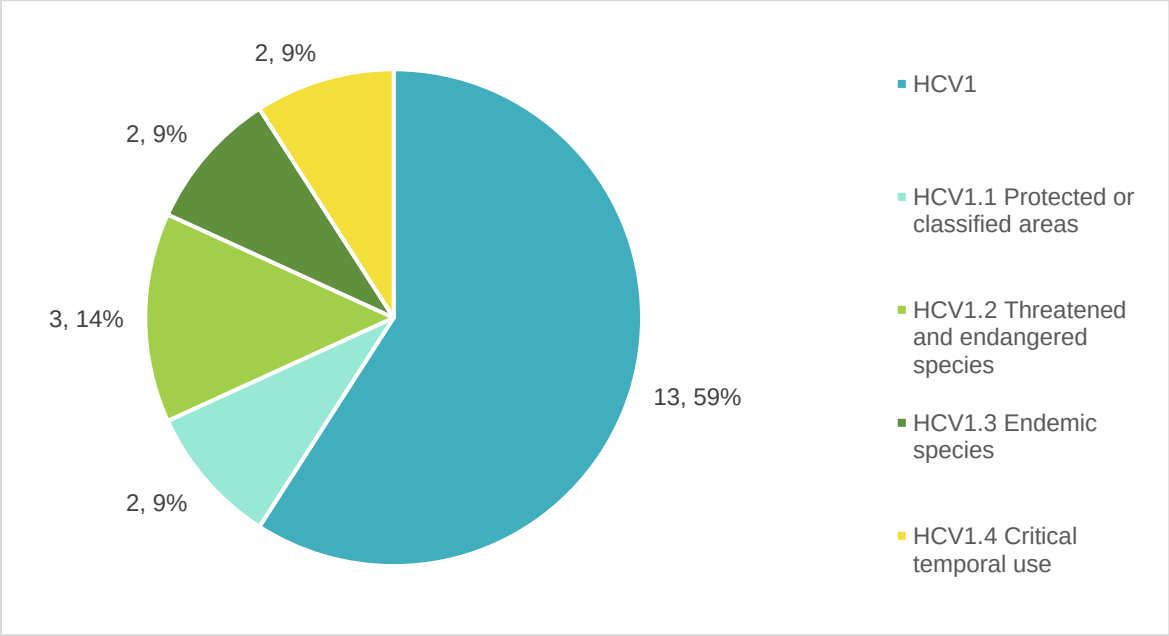


Figure 12. Number of entries per HCV1 sub-category. HCV1 refers to entries with no sub-category indicated.

4.1.3 HCV attributes identification

Table A4 in Annex 1 summarizes the different HCV attributes mentioned in the analysed reports. The table follows the general HCV classification according to an alphabetical order for the attributes, but without considering (for simplicity) sub-categories for HCV1 and HCV4. Instead, attributes classified as any sub-category are mentioned in column “Attribute description”.

The table shows the abundance of each attribute in terms of presence within certificates and number of entries. Some attributes are repeated across different HCV categories because they are mentioned like this in the public audit reports. This is the case of Natura 2000 area PTCON0044 (i.e., Tejo International Natural Park), where reported attributes are considered both under HCV1 and HCV3. No specified Natura 2000 areas are repeated in HCV1, HCV2 and HCV3.

Figures 12 and 13 show the number of attributes identified per HCV type (Figure 12) and per certificate holder (Figure 13). In consonance with Figure 10, Figure 12 shows that HCV1 is by far the HCV type with more attributes identified, with 62% of the values indicated in the reports classified within this class. HCV3 and HCV6 follow, with 15% each.

Figure 13 shows the distribution of certificate holders according to the number of attributes identified within their FSC certified areas. It is interesting to point out that the two organizations ranking first are the Lisbon City Hall (*Câmara Municipal - CM de Lisboa*) and the Forest Resources Regional Direction (*Direcção Regional dos Recursos Florestais, DRRF*) of the Azores, which are both public organizations managing public forests areas, i.e. respectively the Monsanto Forest Park and the São Miguel Island Natural Park.

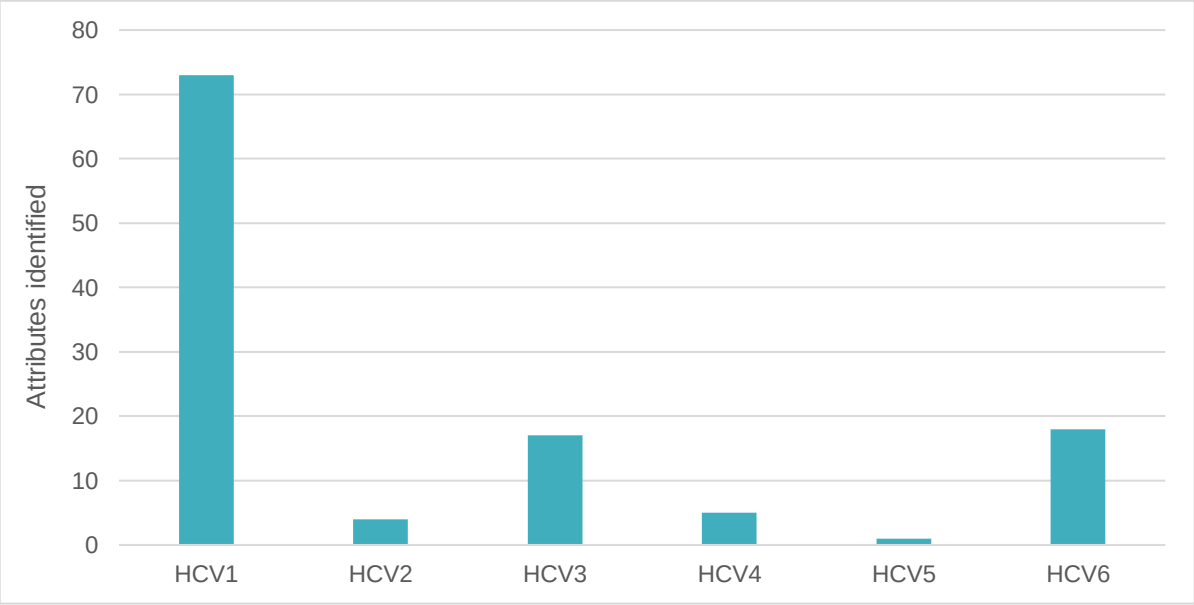


Figure 13. Number of attributes reported per HCV type.

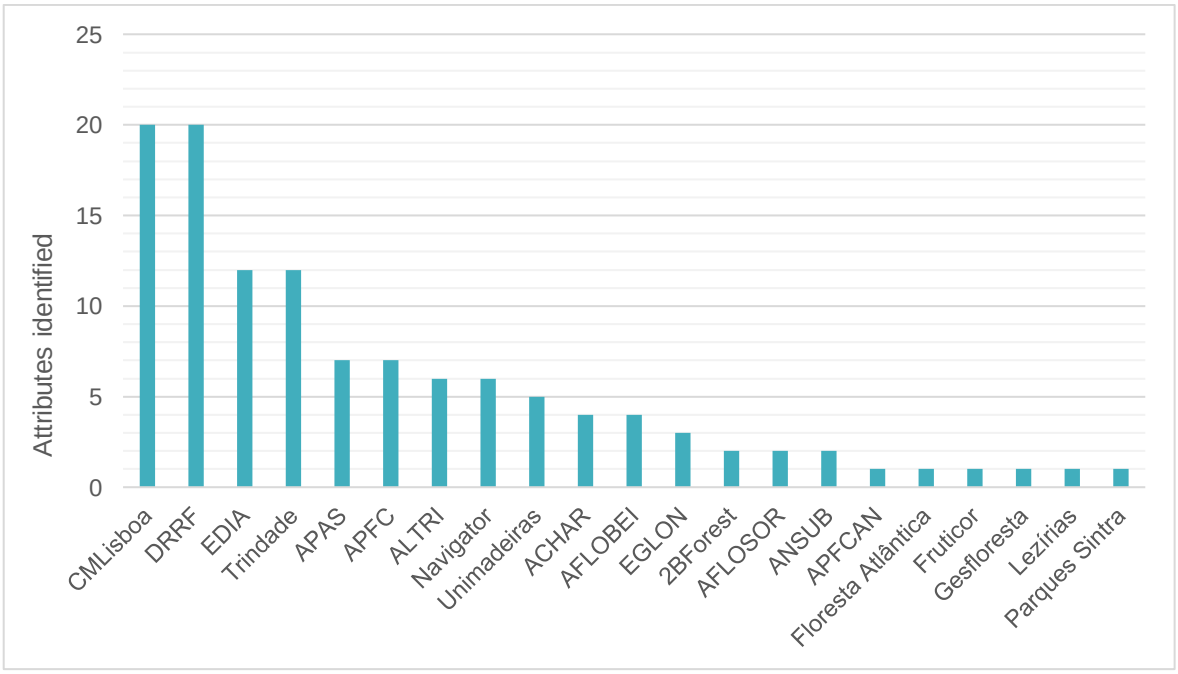


Figure 14. Number of attributes per certificate holder

When all HCVs are considered, the most frequent attribute is the presence of the Bonelli's eagle (*Aquila fasciata*), a large bird of prey classified as endangered in the Red Book of Vertebrates of Portugal (ICNF, 2005), followed by the Iberian lynx (*Lynx pardinus*), a wild cat species endemic to the Iberian Peninsula with Endangered status in the IUCN Red List (Rodríguez and Calzada, 2015). The other most common and recurrent attributes are the Natura 2000 areas and archaeological values. Most of the attributes (84% of them) only appear in a single certificate.

4.2 HCV role in enhancing protection in FSC certified areas

The survey response rate was 90%, with only 3 non-respondents. Figure 14 shows the number (and percentage) of certificates that have some of their HCV also protected by other (i.e. normative) conservation tools. About 48% of the certificates - i.e. 10 certificates, totalling 5263,33 ha and including at least 23 HCVs - do not have protection on their HCV beyond what is requested by FSC certification, while from the remaining 52%, Natura 2000 is the most common protection tool.

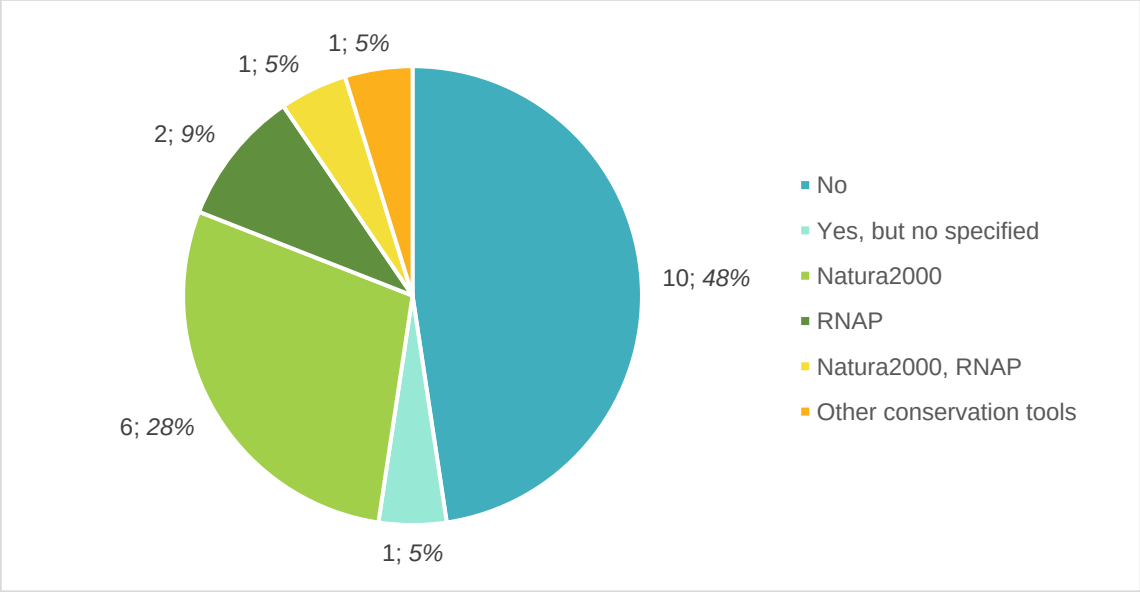


Figure 15. FSC certificates with HCV protected by other conservation tools.

About 61% of the certificate managers considered the HCV approach to have caused at least some changes in the organization management practices (Figure 15), while only 3% declared no changes were made upon the adoption of the HCV approach.

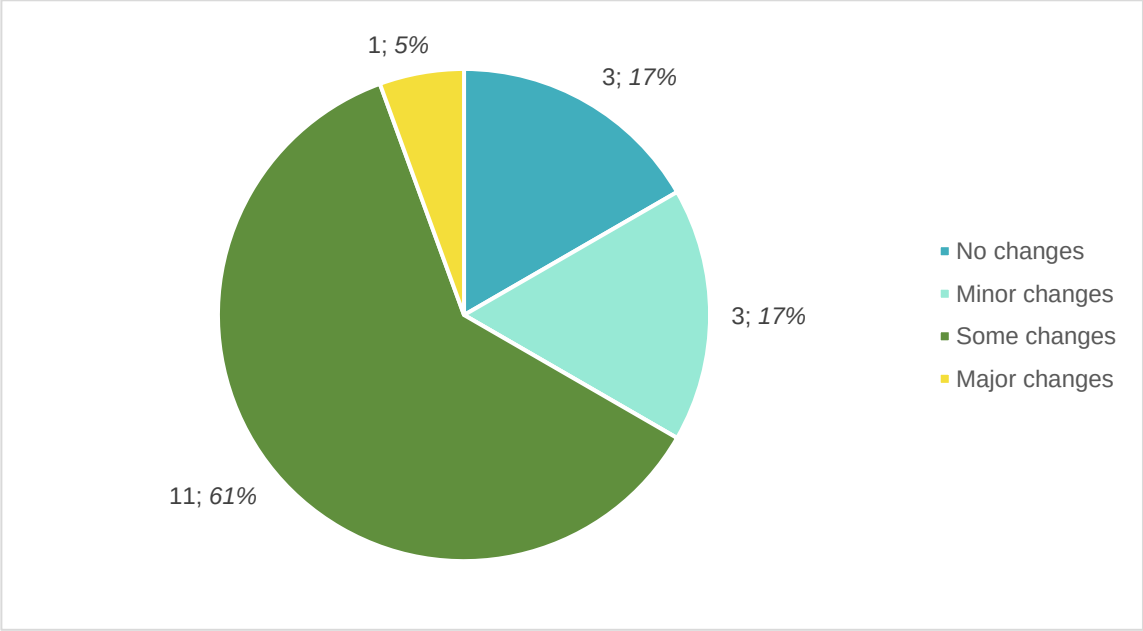


Figure 16. Certificate managers opinion about HCV approach effect to changes in the organization management activities.

Figure 16 reports a ranking of the perceived management areas/activities where changes were made amongst the certified organizations. Stakeholder consultation, workers training and social impacts assessments are those for which more changes have been reported, however changes are also observed with reference to environmental impacts assessments and environmental and cultural values identification. On the other hand, the areas with less changes were in the use of Geographic Information Systems (GIS) and reforestation/afforestation requests. Gender equality promotion and FMP development are also among the areas where less changes occurred.

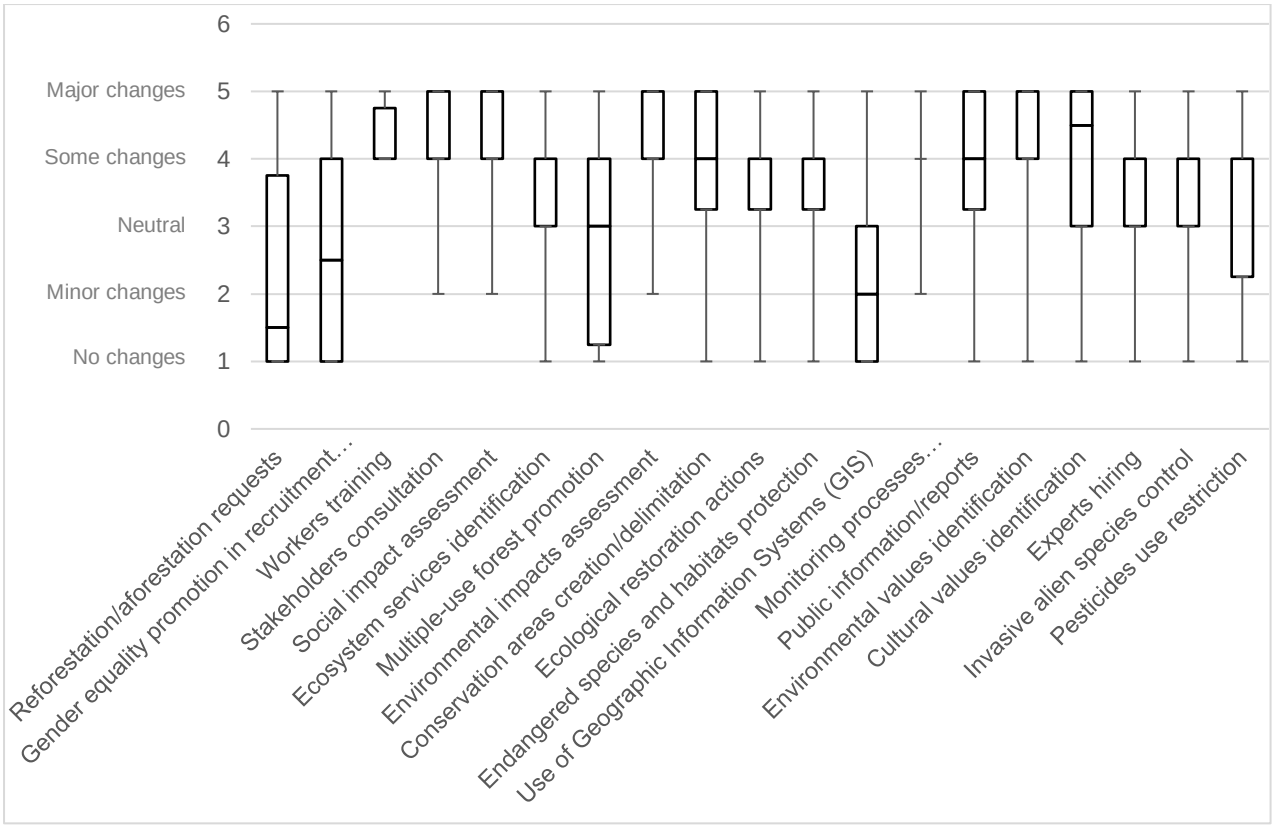


Figure 17. Perceived management areas/activities where changes were made due to FSC forest certification amongst the certificate holders

Table 2. Descriptive statistics (mean, median and standard deviation) for variables reported within Figure 16.

	Mean	Median	Standard deviation
Reforestation/aforestation	2,278	1,5	1,447
Gender equality	2,444	2,5	1,464
Workers training	3,778	4	1,215
Stakeholders consultation	4,278	4	0,826
Social impact assessment	4,278	4	0,752
Ecosystem services identification	3,611	4	1,145
Multiple-use forest promotion	2,889	3	1,568
Environmental impacts assessment	4,167	4	0,985
Conservation areas creation/delimitation	3,778	4	1,396
Ecological restoration actions	3,722	4	1,127
Endangered species and habitats protection	3,611	4	1,290
Use of Geographic Information Systems (GIS)	2,278	2	1,274
Monitoring processes implementation/improvement	3,889	4	0,832
Public information/reports	3,889	4	1,231
Environmental values identification	3,944	4	1,349
Cultural values identification	3,833	4,5	1,465
Experts hiring	3,444	4	1,199
Invasive alien species control	3,111	3	1,132
Pesticides use restriction	3,278	4	1,447

Regarding the importance of HCVs when developing a FMP, Figure 17 shows that 61% of the certificate managers stated HCVs had importance (39% some importance and 22% high importance), while 33% stated HCVs did not have much importance (4% little importance and 11% no importance).

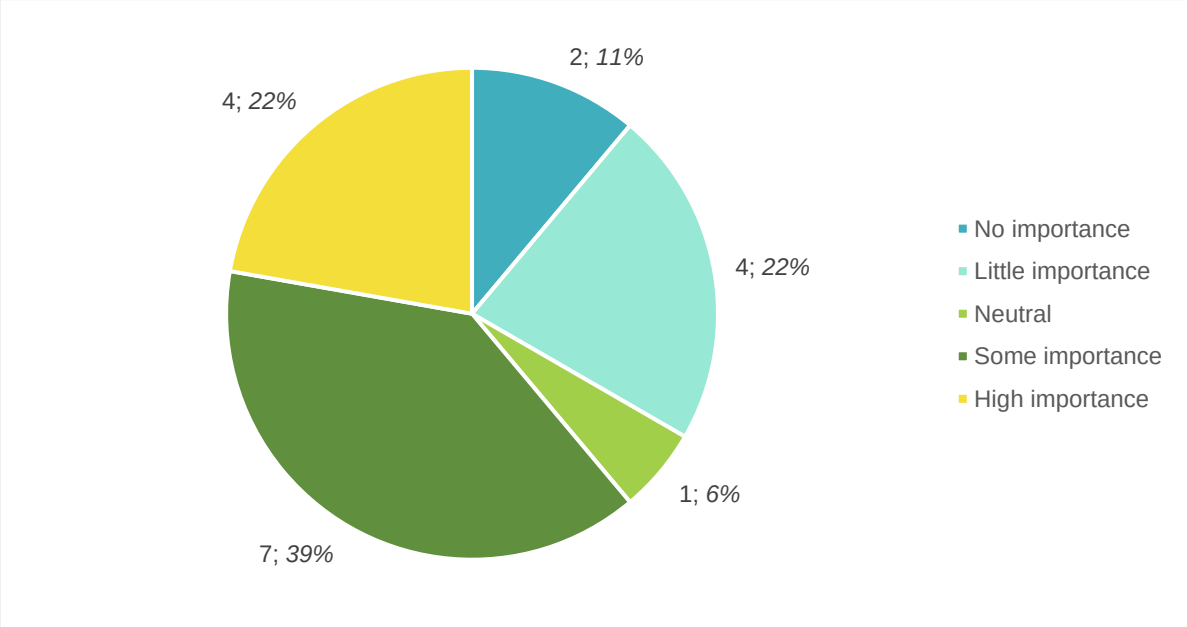


Figure 18. HCVs importance in FMP development.

Finally, 50% of the respondents answered affirmatively when asked about the current or future existence of conservation projects related to HCVs within their organization. Two of them were involved in European Union co-funded LIFE+ projects focused on habitat conservation, more specifically with reference to cork oak (*Quercus suber*) forests and the Azores endemic bird species *Pyrrhula murina*'s habitat. Some organizations have their own conservation strategies, under which they carry on activities like sensibilization actions (i.e. APAS Floresta, Unimadeiras S.A.), tree species plantations (i.e. *Quercus canariensis* plantation by The Navigator Company) or animal species conservation projects (i.e. *Aquila fasciata* also by The Navigator Company). Another project mentioned is the Renature Monchique, that aims to restore Natura 2000 Network habitats which were affected by a severe wildfire in the Serra de Monchique in 2018. The initiative is financially supported by the flight company Ryanair. The last project mentioned was Green Heart of Cork, aiming to create Payments for Ecosystem Services (PES) mechanisms and developed by the WWF in the South of the Iberian Peninsula.

4.2.1 HCV related non-conformities analysis

The NC analysis showed little presence of HCV-related NC in comparison to the amount of NC dealing with other requirements of the FSC standards. Only 3% of the total issued NC as identified in the reports revised were HCV-related NC and all of them, but one, were Minor CARs.

The HCV-related NC were unevenly distributed amongst the different certificates, with some of them having more than one HCV-related NC. As a result, HCV-related NC have been reported in 38% of the certificates analysed within this study. Figure 18 shows that 70% of the HCV-related NC were identified in the main assessment during the certification process and were amended before the next audit.

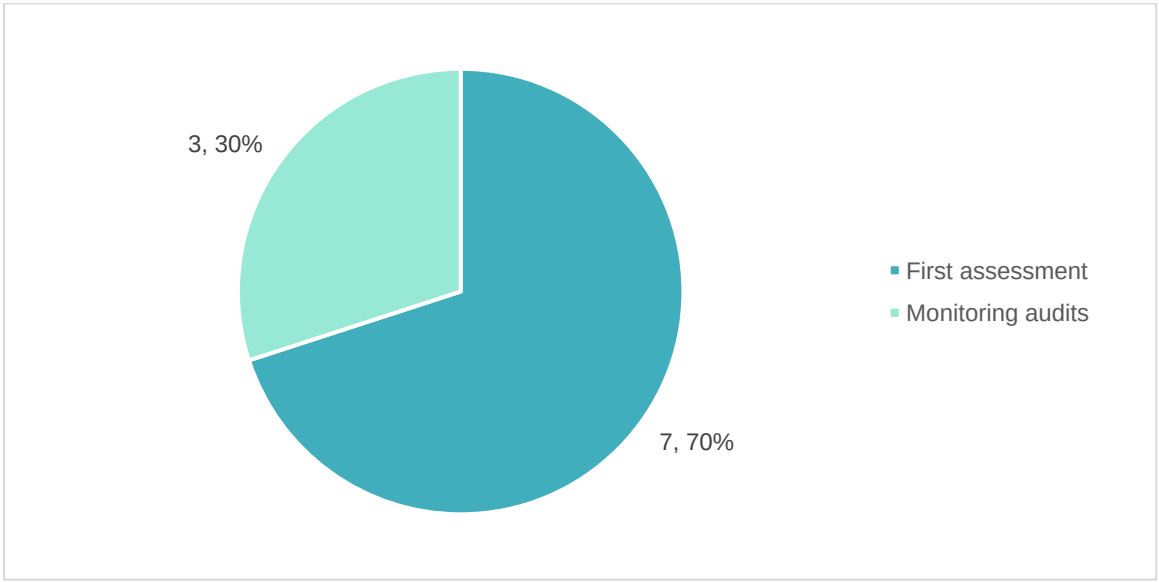


Figure 18. Moment of HCV-related NC identification

Figure 19 shows the distribution of the different kinds of HCV-related NC. In this case the most common ones were NC related to indicator 9.2.1 of the FSC National FM Standard, which refers to stakeholder consultation for HCV management. The other two most common NC are related to indicators 9.4.1 and 9.4.2, which are about the monitoring plan and its communication to interested parties (stakeholders). If NC related to criterion 9.4 are considered all together, without distinguishing them according to single indicators, HCV monitoring (i.e. criterion 9.4) is the aspect that leads to more NC.

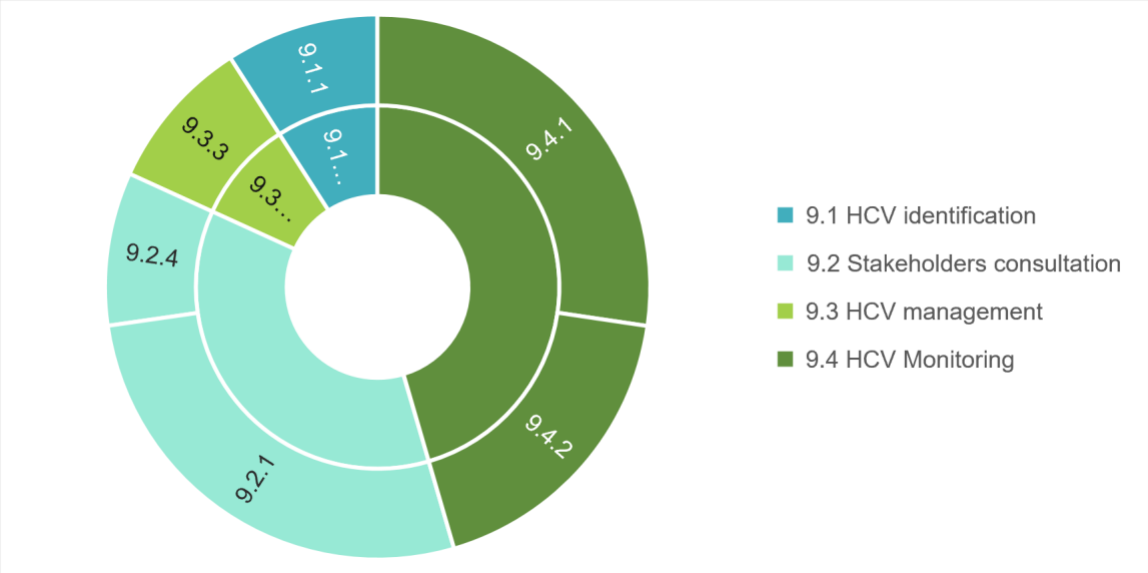


Figure 19. HCV non-conformities distribution per Criterion and Indicator.

4.3 Advantages and disadvantages of HCV approach in FSC certification

About 89% of the respondents consider the HCV approach as a challenge for the FM activities (Figure 20). Moreover, 50% of the organizations make use of external support to carry out activities related to HCV management. The external help identified consisted mostly of experts or consultancy services involved for the identification of both biological and cultural values, and in most cases, the help was provided in a timely manner.

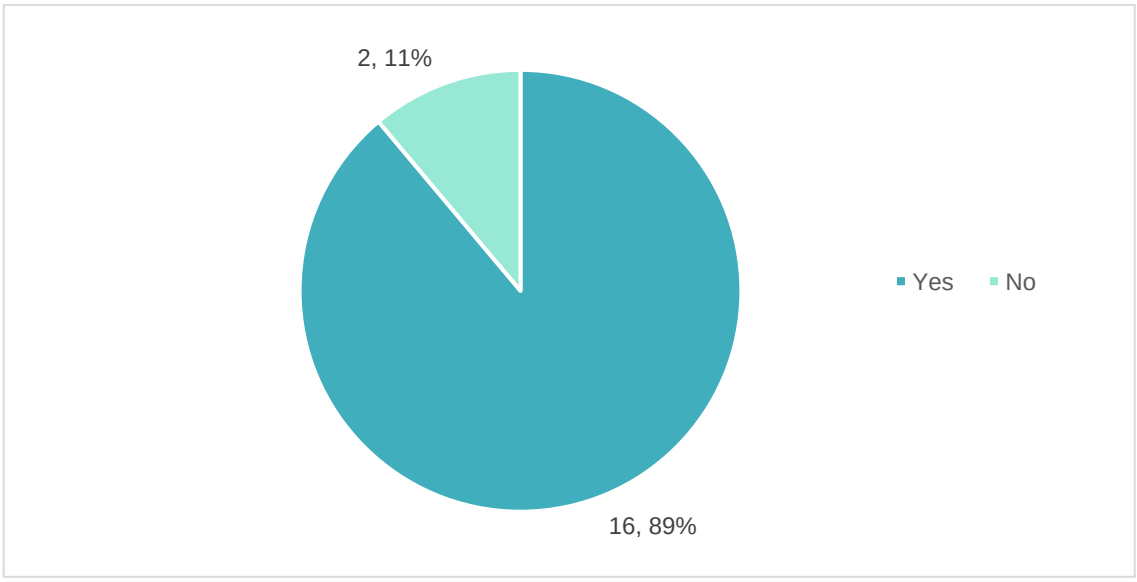


Figure 190. Respondents opinion about HCV approach in FSC forest certification as a challenge.

The organizations with more than one type of HCV identified how challenging it was to manage each HCV type in their certified areas. Unfortunately, the response rate for this particular question was low (72%), as 5 respondents did not reply. As a result, the following information is showed as part of the survey answers summary, but not considered for further analysis.

Figure 21 shows the percentages of certificates that consider each HCV type the most challenging one. It can be noticed that for HCV5 the percentage is 100%, because this HCV type was identified as challenging by the only certificate holder in Portugal reporting HCV5 within the certificate scope. Regarding the other HCV types reported across several certificates, HCV1 has the highest percentage (29%), followed by HCV3 (20%) and HCV6 (17%). HCV2 and HCV4 were not mentioned by any respondent.

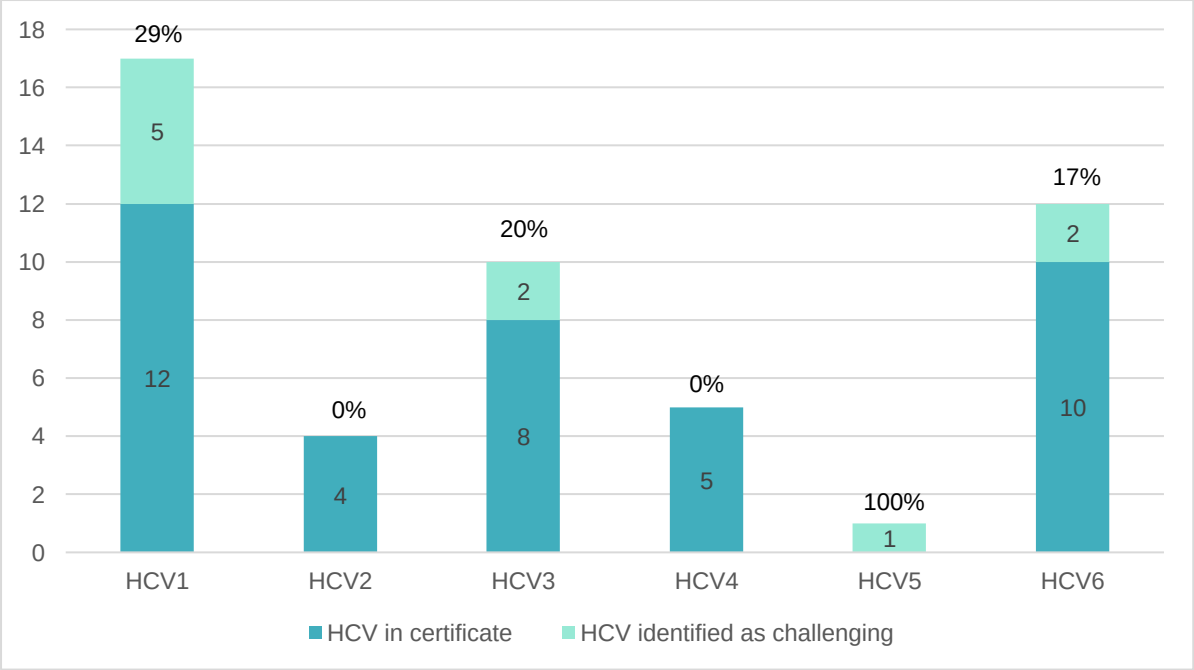


Figure 21. Challenge perception by HCV type in organizations with multiple HCVs.

4.3.1 Assessing and rating the perceived benefits of the HCV approach

As it can be observed from Figure 22 and Table 3, the respondents' perception of the benefits and importance of HCVs is in general quite high, with only one benefit having a mean lower than the neutral importance value 3. "Social and environmental responsibility" is the benefit with the highest importance, followed by "Environmental impact assessment". "Conflict prevention" is the benefit with the lowest perceived importance, followed by "Access to experts/specialists" and "Access to more scientific knowledge". "Ecological restoration actions" is the benefit with the widest answer distribution.

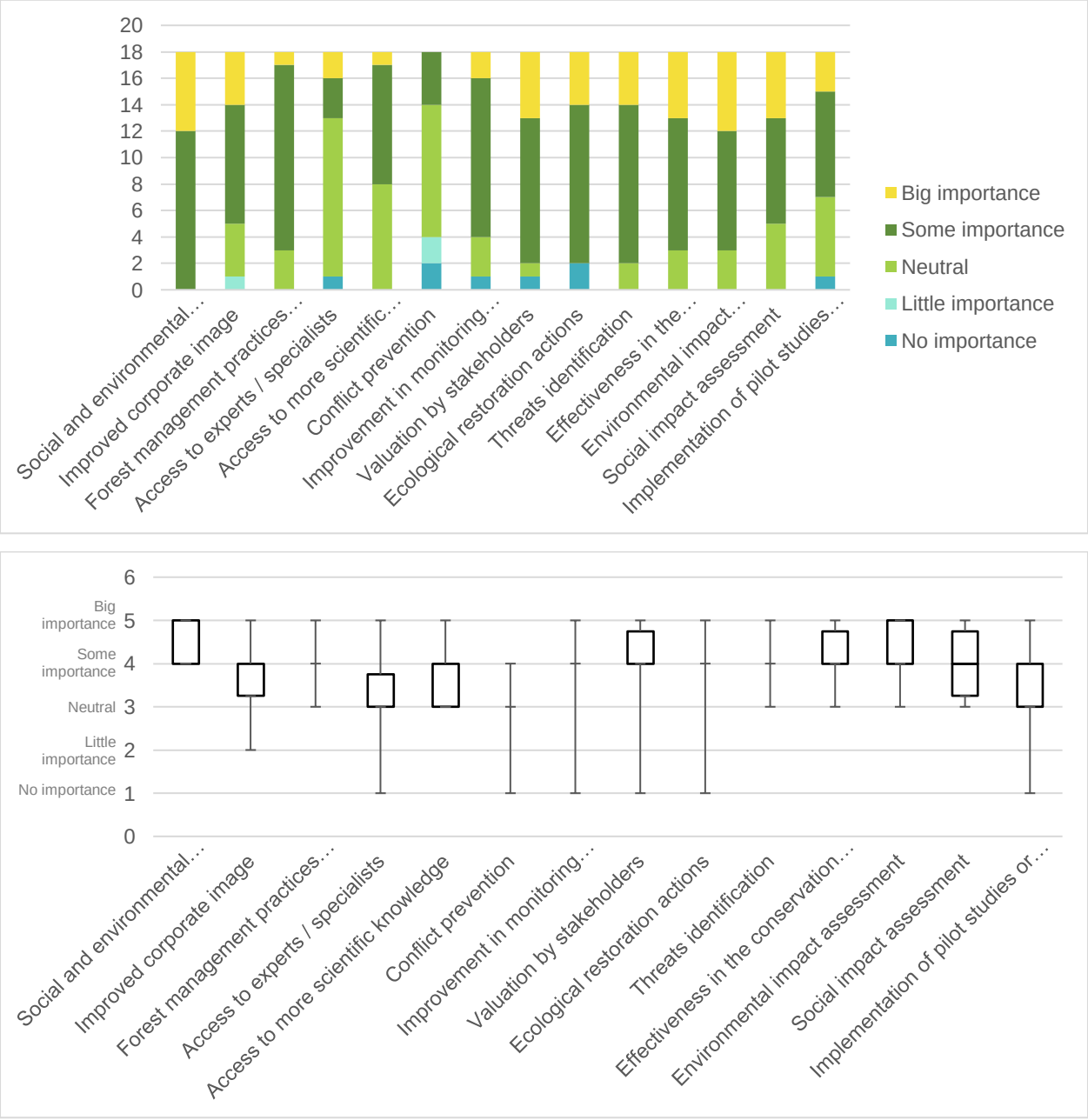


Figure 202. Rating of the perceived benefits of the HCV approach

Table 3. Descriptive statistics of variables reported in Figure 22.

	Median	Mean	Std Deviation
Social and environmental responsibility	4	4,333	0,485
Improved corporate image	4	3,889	0,832
FM practices improvement	4	3,889	0,471
Access to experts / specialists	3	3,278	0,895
Access to more scientific knowledge	4	3,611	0,608
Conflict prevention	3	2,889	0,900
Improvement in monitoring procedures	4	3,778	0,878
Valuation by stakeholders	4	4,056	0,938
Ecological restoration actions	4	3,889	1,132
Threats identification	4	4,111	0,583
Effectiveness in the conservation and protection of species and habitats	4	4,111	0,676
Environmental impact assessment	4	4,167	0,707
Social impact assessment	4	4,000	0,767
Implementation of pilot studies or conservation projects	4	3,667	0,970

Figure 23 shows how, when benefits are grouped into the three broad categories -i.e., social, environmental and economic benefits- the group with highest perceived importance is the one associated to social benefits, while the group with the lowest perceived importance is the one dealing with economic benefits. Nonetheless, there is no statistical significance for the perceived importance differences (p-value of 0,28).

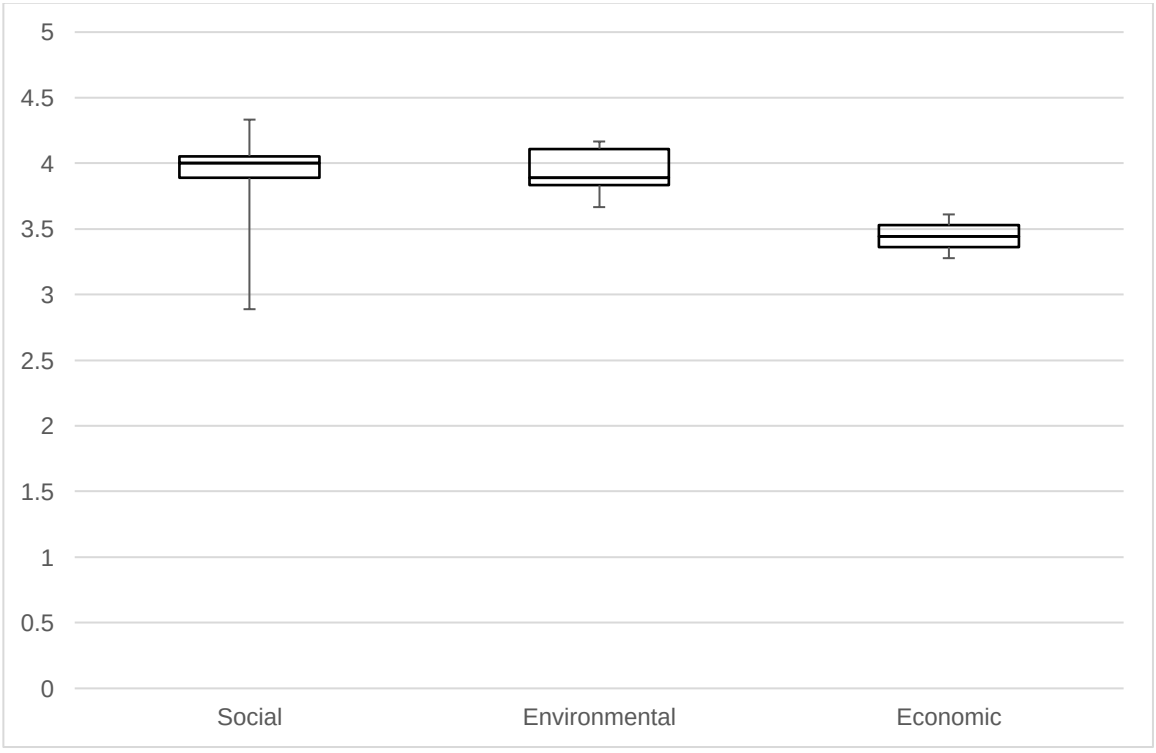


Figure 213. HCV approach perceived benefits grouped by social, environmental and economic categories.

Table 4. ANOVA test results for Figure 23.

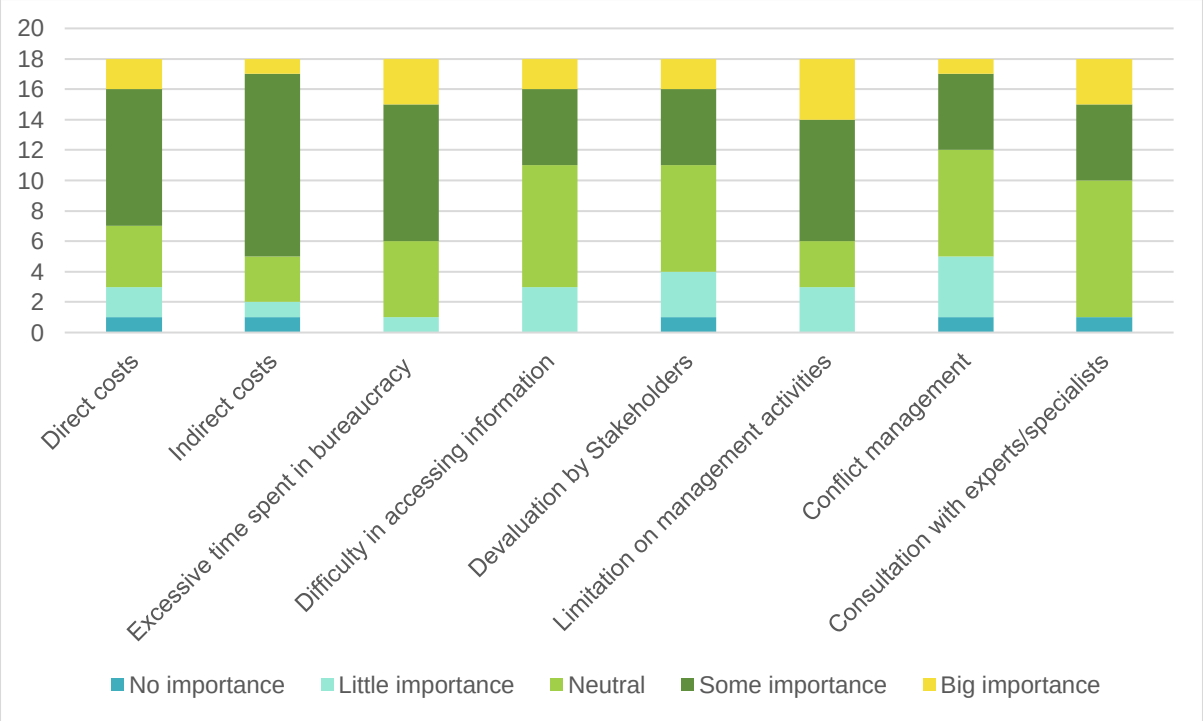
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0,38888889	2	0,19444444	1,43181818	0,28011437	3,98229796
Within Groups	1,49382716	11	0,13580247			
Total	1,88271605	13				

Besides the benefits already reported by the survey, respondents had the option to include additional ones of their own. One of the benefits reported is the possible role of the HCV approach in helping to prioritize conservation efforts in areas with high environmental value, allowing for a more efficient effort distribution. Another respondent valued the fact that the implementation of the HCV approach allowed for an increase in the perceived value of the HCVs at the organization level and their valuation via proper FM solutions, through workers training. Lastly, another benefit mentioned was that the HCV approach allows to value and promote territories that are traditionally felt as unproductive and, therefore, less valuable.

4.3.2 Assessing and rating the perceived disadvantages of the HCV approach

As regards the perceived disadvantages, the perceived importance is overall slightly lower than in the case of advantages, though, there are no disadvantages with a rating below 3 (neutral importance). The standard deviation is bigger than in benefits perception. “Excessive time spent in bureaucracy” is the disadvantage with the higher mean and with the lowest standard deviation values. “Conflict management” is the disadvantage with the lower perceived importance (Figure 24).

As for the differences amongst environmental, social and economic disadvantages, there is no statistical significance in this case either (p-value of 0,17). Even though Figure 25 displays opposite results when compared to those observed for benefits: the social disadvantages are the ones with lowest perceived importance while economic disadvantages are the ones with the highest perceived importance.



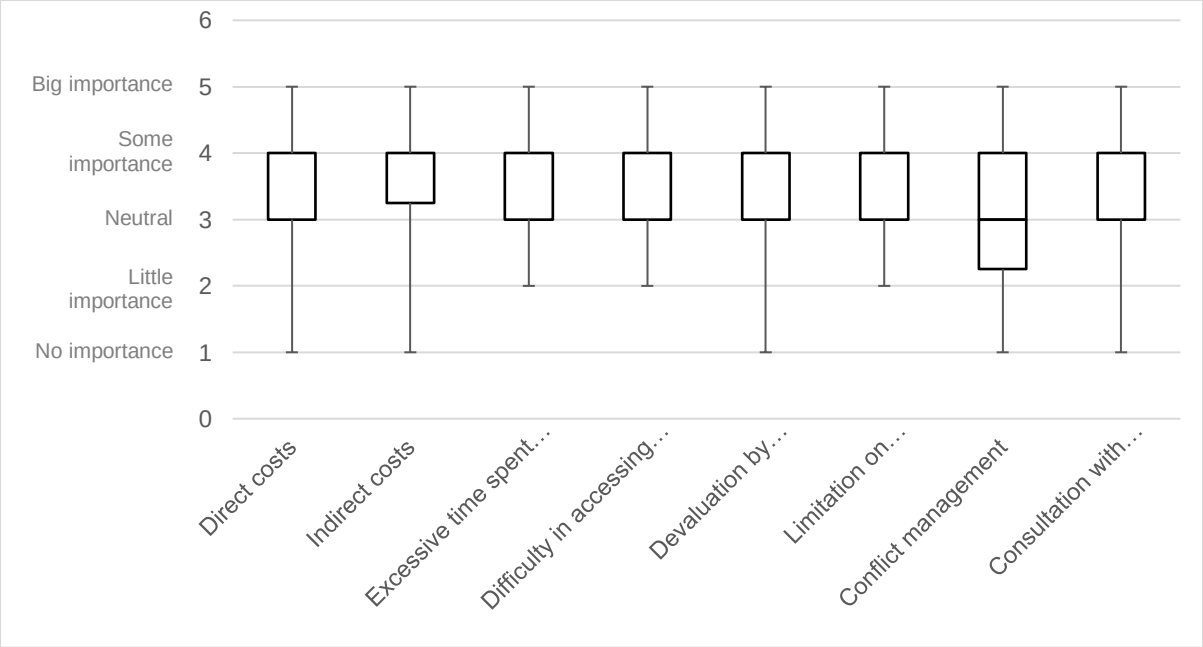


Figure 224. Rating of the perceived disadvantages of HCV approach

Table 5. Descriptive statistics of variables reported in Figure 24.

	Median	Mean	Std Deviation
Direct costs	4	3,500	1,043
Indirect costs	4	3,611	0,916
Excessive time spent in bureaucracy	4	3,778	0,808
Difficulty in accessing information	3	3,333	0,907
Devaluation by Stakeholders	3	3,222	1,060
Limitation on management activities	4	3,722	1,018
Conflict management	3	3,056	0,998
Consultation with experts/specialists	3	3,500	0,985

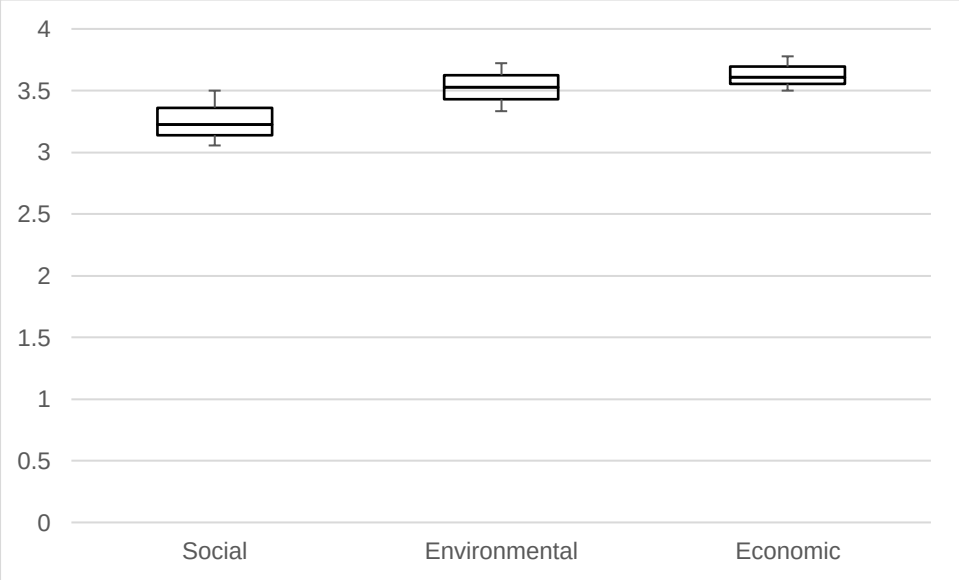


Figure 25. HCV approach perceived disadvantages grouped by social, environmental and economic categories.

Table 6. ANOVA test results for Figure 25.

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0,21617798	2	0,10808899	2,50745823	0,17611919	5,78613504
Within Groups	0,21553498	5	0,043107			
Total	0,43171296	7				

Respondents reported more additional disadvantages compared to the additional benefits already indicated. A comment was made about the worthlessness of the efforts for restoration attempts of severely degraded areas but with little recovering possibilities, leading to a resource and effort waste. This seems to be quite in contradiction with what was reported for the benefits. Another interesting disadvantage pointed by a respondent was the low resistance and resilience of HCVs to extreme events (i.e. wildfires), which could mean risks and possible inefficiencies for the

organization. Failure to standardize HCV identification and definition for the organizations at a national level was the only added disadvantage mentioned thrice by the respondents, in one of the cases in addition to the difficulties to establish a protected area for animals (i.e., bird species). Another disadvantage for the certified organizations is the increased number of constraints for FM activities. One respondent mentioned also difficulties in the proper understanding of the HCV concept by forest owners and managers. Ultimately, two additional disadvantages were identified with regard to the stakeholders' participation: lack of information to ensure an informed participation and difficulties to manage effective stakeholders' participation.

Figure 26 displays how HCV approach advantages are given more importance by the certified organizations in comparison to the disadvantages. However, no statistical significance was detected (p-value of 0,02).

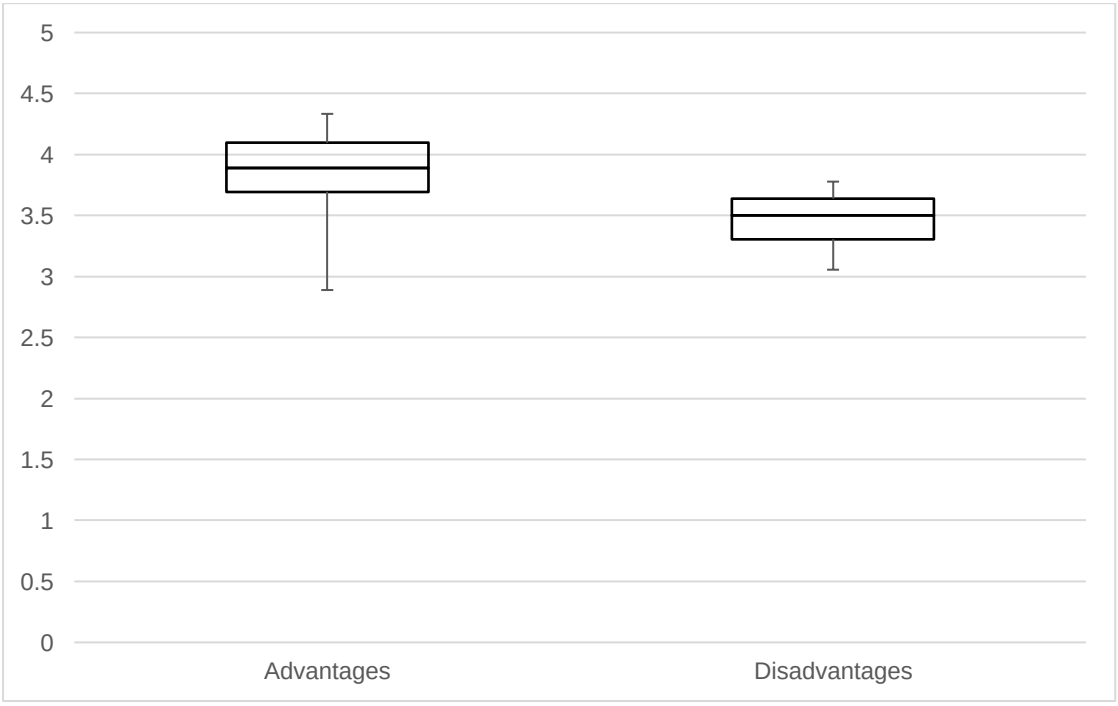


Figure 26. HCV approach advantages and disadvantages perceived importance by FSC certified groups in Portugal.

Table 7. ANOVA test results for Figure 26.

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0,68963945	1	0,68963945	5,95947809	0,02406163	4,3512435
Within Groups	2,31442901	20	0,11572145			
Total	3,00406846	21				

5. Discussion

The findings of this study demonstrate that the contribution of the FSC HCV approach to environmental value conservation in Portugal has proven to be worthy. HCV approach showed to have impact on management in forest certification and to increase the protected area located outside formally established conservation areas. Next paragraphs comment and discuss in detail the results for each specific objective reported in the introduction chapter. After that, the study limitations are commented, alongside with future research suggestions. Finally, an analysis of the HCV approach and its potentialities will be carried out.

5.1 Results interpretation

The first specific objective was to identify the HCVs present in FSC certified forests in Portugal. Regarding that, HCVs are present in 62% of the certificates but they only account for around 6% of the total certified forest area. This result brings two considerations. First, as explained in the methodology section, the area measurement has been controversial due to the lack of data within the reports, as well as not standardized reporting. As a consequence, the 6% figure needs to be taken carefully, as it is an estimated value based on the available reported data. This is to be linked to the fact that forest ownership in Portugal is highly fragmented, and FSC group certification is very common. Certified groups often include within their scope forest areas spread all over the country and these areas are usually small, which means a certificate with HCV within its scope can exist even when the HCV is only present in one member's area, thus finally resulting in limited HCVs presence and representation.

Another issue related to this result is the fact that each certificate including HCVs within its scope may imply relevant efforts in terms of value identification, stakeholder consultations, management changes and monitoring activities. For this reason, this analysis considered other metrics besides the size of HCV areas, such as the changes caused to certified organizations by FSC certification implementation.

As regards the abundance and distribution of the different HCV types, HCV1 is the prevalent one -both in terms of number of certificates and certified area- and this may be explained by two main reasons. As a first one, Portugal is a very biodiverse country (Nunes et al., 2019), and this could translate into a higher number of attributes of this type. Moreover, certified areas are spread all over the country and, as reported in the background section, they stretch into different climates (from Atlantic to Mediterranean) that lead to the presence of different species and habitats amongst the certified forest areas.

A second possible reason for the prevalence of HCV1 is the role of the two organizations with the highest number of HCV1 attributes identified within the corresponding audit reports: the Câmara Municipal de Lisboa and the Direcção Regional dos Recursos Florestais from the Azores. These two organizations share similar characteristics: the certified forest areas are both public owned and managed, and timber production is not the main goal for their FM. A similar situation is reported in Ioras et al. (2009) for Bosnia-Herzegovina and Romania, where it is stated that the type of ownership tends to influence the level of efforts regarding the identification and management of representative forest ecosystems. With this information it could be possible to speculate if factors like management aim may influence HCVs identification.

Moreover, Ioras et al. (2009) study had comparable results regarding HCV types abundance distribution and suggested that the reason for HCV1 and HCV3 prevalence is because these values are more likely to be protected by existing legislation, which leads to forest managers having more awareness of their existence.

Strong human intervention over time and high forest fragmentation (Agestam and Nilsson, 2017; Nunes et al., 2019) explain the limited presence of HCV2 type in Portugal. Similarly, HCV5 is quite uncommon in the country as it is only present in the Direção Regional dos Recursos Florestais (DRRF) for the Azores islands certified forest. As explained in section 2.1.2.5, during the HCV national interpretation development process in Portugal experts debated on whether to keep this value type or not, because of the lack of native communities in the country (Bugalho and Santos, 2018). The presence of HCV5 in Azores is due to the existence of water springs which

are used as a main water source by the locals. Still, the results support the reasons considered when debating the inclusion of this HCV type in the Portuguese context.

Lastly, it is also interesting to comment on HCV6 abundance, which shows a lower number of certificates/entries in comparison to the other HCV types. The reason for this is wrong reporting amongst the certificates: in the case of organization 18, thirteen cultural attributes have been identified but the corresponding forest area has not been reported.

Finally, with reference to the identification of the HCV attributes, it is necessary to stress the lack of reporting standardization, in particular with reference to how attributes are identified and accounted in the reports: some certificates identify the different areas where the attributes exist while other just record their presence but do not report additional information. Attributes tend to vary amongst certificates: the most common attribute, *A. fasciata*, is only reported in 4 certificates out of 21. Reasons behind this variability may be found among the same ones already reported to explain the prevalence of HCV1 type: on the one hand the biodiversity richness of Portugal and on the other the role of the two organizations with more attributes identified. In particular, in the case of DRRF, the forest area is located in the Azores, an archipelago that belongs to the biogeographic region of Macaronesia, one of the richest regions in terms of biodiversity in Europe, with 35% of its flora being classified as endemic species (Schäfer, 2005). This explains why most of the attributes identified in this certificate are not repeated in other certificates from continental Portugal.

Objective 2 aimed to evaluate the impact of the HCV approach on FSC forest certification in enhancing conservation outside traditionally protected areas, like Natura 2000 or Special Nature Protection areas. The first result obtained from this study analysis is the conservation additionality HCV approach gives to FSC certified areas. Indeed, about 48% of the certificates do not have other conservation tools protecting their HCVs besides FSC certification requirements and managing practices, which means that these HCVs had likely higher chances of being neglected without forest certification in place. Likewise, Ioras et al. (2009) also highlights how HCV approach raises protection of cultural values and sustainable management for local communities, which are values that are not always covered by conservation legislation

in the countries. This is important to stress the value of FSC certification as an added tool to enhance protection further than legal requirements.

HCV area outside formally protected areas accounts for only 0,2% of SNAC estimated area and provide some additional protection and conservation beyond the 2,70 million ha from SNAC (estimated from ICNF, 2020a). Given data gaps with reference to HCV area and the fact that this cannot be the only factor that defines the HCV approach contribution, other analysis is taken into consideration to address objective 2.

One way to evaluate it is to consider the impacts this approach has on the FM planning and related activities. Previous studies (Newsom and Hewitt, 2005; Cubbage et al., 2010) have reported that forest certification causes clear and substantial changes for certified organizations. This study wanted to prove if HCV approach is responsible of any of these changes. For that, survey data was used. Results indicate that more than 60% of the certified organizations made changes in their organization management practices and the most common changes were in the areas of stakeholder consultation, social and environmental impacts assessments and worker training, as well as in environmental and cultural values identification. All these areas are the core of the HCV approach and go beyond the domain of traditional FM practices focused on technical management and legal requirements. Forest certification goes farther than ordinary FM, including for example social issues. A sample of this is the stakeholders participation requirement that is present all along the FSC standard.

Regarding the existence of conservation projects related to HCVs in the surveyed organizations, more than half (5 out of 9) of the programs were developed by the organizations themselves, which may suggest that HCVs identification is important in order to incentivise conservation actions and especially in order to point these conservation efforts to the existent HCVs.

Within the framework of objective 2, CARs were also analysed to evaluate whether certified organizations fully comply with FSC Principle 9 or not. With only a 3% of HCV-related NC, we can consider Principle 9 requirements are largely met by the organizations, thus supporting also the hypothesis that the HCV approach is actually

applied and followed. The FSC certification auditing and monitoring system adds value to the HCV approach, as it ensures that organizations abide by the rules over time.

When analysed in detail, one of the most common HCV-related NC are about stakeholders' consultation and participation, which seems to confirm some survey results about challenges posed by the HCV approach.

The results of this NC analysis are in line with findings by Newsom and Hewitt (2005) about the global impacts of SmartWood certification, where Communication and conflict resolution with stakeholders, neighbours and communities was the third most common issue in the conditions given during forest certification assessments and it was mentioned again when focusing in HCVF addressing requirements. Also, in Lukashevich et al. (2016) study about FSC certification CARs in Russia, stakeholders' consultation (indicator 9.2.1) was the main non-compliance for Principle 9.

These convergences allow to spot an area of FSC certification, and in particular of the HCV approach, where organizations struggle and some improvement could be done, as it will be exposed and further developed in the recommendations section within this chapter.

The objective 3 was aimed to focus on HCV impacts on the certified organizations themselves. About 90% of respondents include to some extent the HCV approach within their FM activities.

First, HCVs are a challenge by their own nature as they can be difficult to manage and monitor and they often do not directly benefit the organization in terms of production and financial returns, thus representing a (pure) cost in financial terms. Due to their complexity they may not be resistant to extreme events and disturbances, both natural and man-induced, which can lead to additional direct and indirect costs.
Besides intrinsic difficulties, associated to the nature of HCVs, additional challenges are due to the complexity of the HCV approach and associated procedures. While sometimes adding bureaucratic load to the managers, including associated transaction costs, it also poses technical challenges for which forest organizations do not have all the tools, i.e. information and guidance. This includes knowledge and

technical gaps with regard to the HCV identification and management, that represents a key challenge and barrier, and can be interpreted as a gap in terms of supporting tools for the organizations willing to implement the HCV approach successfully.

On this line, a couple of studies propose some solutions to improve the implementation of the HCV approach. Senior et al. (2015) suggest further knowledge exchange between researchers and HCV users through mechanisms like a working group to develop a science evidence-based or a researcher database to help HCV users to find scientific experts to consult. These mechanisms are suggested to be implemented by formal organizations: in the paper it was suggested the HCV Resource Network to have a leading role, but in the case of Portugal, given the focus on forest certification, coordination could be done by FSC.

Sánchez-Almendro et al. (2018) developed a three-phase protocol using objective criteria for the identification, assessment and monitoring of habitats considered to fall within HCV areas. Their proposed methodology was applied in the Southern region of Huelva, Spain, with the aim to develop a methodology which could be then scaled-up to other European FM sites.

Regarding the perceived benefits associated to the adoption of an HCV approach within FSC FM certification, the respondents valued the social and environmental ones more, implying a concordance with the HCV approach focus on environmental and social issues. On the other hand, when talking about disadvantages, the focus was more on economic issues. While this survey results are in line with the HCV approach aims, they also highlight that HCV implementation is largely seen as a cost. Similar perceptions about certification are reported in Cubbage et al. (2010 and 2009) in their study about impacts of FM certification in Latin America. Most certified organizations in both cases care about good FM practices and intend to remain certified, although the lack of a premoium price for certified products is perceived as a non-negligible limitation.

In the case of Portugal, where most forests are small in size, have limited production capacity and are therefore vulnerable to extra expenses with low Return On Investment (ROI), it is important to stress even more the importance economic aspects

have for certified organizations. Ignoring both technical and economic issues could lead to poorer HCVs identification and management and, ultimately, could discourage forest certification.

Nevertheless, when compared with regards to the perceived importance by the certificate managers, HCV benefits have higher importance than disadvantages. It is encouraging to see that managers' perception and general attitude about HCV approach are positive, showing that conservation could work alongside productivity.

5.2 Study limitations and future research needs

As mentioned in the introduction chapter, among the limitations of the present study difficulties to demonstrate conservation benefits have a relevant role (Sheil et al., 2010; Di Girolami and Arts, 2018; Areendran et al., 2020). As a consequence, the study focused on impacts estimated through metrics that could be measured through the available data and time. Even though it is based on indirect evidence, the research still provides an interesting overview of the HCV approach with reference to Portugal.

Reliance on secondary data with no previous standardization was also a limitation. For this reason, the results derived from this data should be considered carefully and mainly regarded as a preliminary attempt to systematically analyse the HCV approach in Portugal. Despite limitations, this provides some interesting insights that may represent starting points for future research and call for improvements to the research approach.

Future research should consider other and more reliable data sources, for example, the HCV management and monitoring documents developed by the certified organizations. This may be complemented by field work and vis-à-vis interviews (or focus groups) that could allow to consider other impacts/aspects besides the management actions or the users perceptions. Post-Covid conditions will hopefully allow additional data collection from primary sources in the case future research activities are performed.

User's perceptions could be another interesting area of further research, as the current study only focuses on certificate managers' opinions. HCV approach potentially affects a broad group of stakeholders on different ways, from certificate managers to forest workers, from NGOs to public administration, from local communities down to forest product consumers. Grasping opinions by different stakeholders and the way they consider this topic, including benefits, difficulties, impacts and possible improvements could be a helpful exercise to improve HCV management in practice.

Finally, this study sets the first stone for the development of further studies on a larger scale. Comparing different countries proved to be the preferred methodological approach, such as in the case of studies about the impacts of HCVF in Bosnia and Herzegovina and Romania forest policies (Ioras et al., 2009) or the comparison of impacts of FM certification in Argentina and Chile (Cubbage et al., 2010).

The HCV approach could become a general reference and study framework to allow develop analyses both at a global and regional scale with different levels of depth. It could be interesting to develop a global comparative analysis of HCV approach regarding its implementation in different countries, its perceived benefits/barriers or even a global mapping of HCV categories. Additionally, more detailed comparative analysis could be done at a regional level in areas with similar environmental and social contexts, e.g. the Iberian Peninsula or the Mediterranean region.

5.3 HCV approach potentialities and recommendations

The following suggestions focus on solving issues encountered during the study development and challenges pointed out by the certificate managers to improve the implementation of the HCV approach.

Both the secondary data analysis and the survey results stressed the need to improve the standard reporting system for the audit reports to allow future reliable data analyses. It is necessary to establish mandatory information to report and define

concepts and metrics regarding HCV area measurements, HCVs presence counting and even HCV types identification.

Under the HCV approach the certified organizations carry out a non-negligible amount of work to identify, manage and monitor the HCVs present in their areas, follow audit activities and inform stakeholders. It is unfortunate that the information resultant of all this work cannot be currently appreciated in a systematic manner under the FSC scheme due to the lack of standardization in the way it is delivered. Fortunately, as of the time of the publication of this study, FSC Portugal already has the intention to develop a standard certification template to be used by certified organizations and certification bodies that considers an improvement on HCVs reporting.

The survey also pointed out recurrent challenges for the certified organizations when dealing with the HCV approach, specifically in the areas of HCV identification, stakeholders' consultation, HCV monitoring and economic rentability. The improvement of these aspects would also mean to seize the potentialities of the HCV approach as a tool outside of the certification reports. Moreover, the survey results showed consistency with conclusions from previous studies in other regions, not only regarding the HCV approach, but forest certification as a whole. From this it can be assumed that some of these issues, especially the most general ones like stakeholders' consultation and economic rentability may be cross-cutting issues at a global scale for the FSC certification scheme. In this perspective, it is remarkable that FSC is currently working on the development of a guidance and best practices on stakeholder engagement processes performed by certificate holders.

Guidance on the above-mentioned aspects could be offered in the form of divulged information, formation by means of workshops and training and even consulting/assessing services. These activities could be managed by FSC itself, but also by interested stakeholders, e.g. environmental groups, consultants, etc. Moreover, the HCV Portuguese national interpretation is fairly recent, which means that stakeholders opinions could be useful to help improve the adaptation of the interpretation to the national context with real experiences.

With regard to the forest certification profitability issue, Gullison (2003) and Cubbage et al. (2009) already pointed out the need to increase certification benefits for producers, through gaining market access and price premium or decrease direct costs, to enhance forest certification expansion. In order to achieve this, Gullison (2003) suggests investing in consumer education and at the same time to look for ways to subsidize direct costs for forests managers. Actors like governments should have a more active role in increasing the value of certified products, considering that responsible FM practices generate public environmental and social benefits. While the European Union Timber Regulation already prohibits the entrance of illegally sourced timber to the European market, stronger policies to favour responsible forest certification products should be implemented.

Another issue is the cost of setting aside productive areas for HCVs in certified forest. For years, ecosystem services provision has been implicit within FSC certification, assuming that it would mean direct market benefits like premium price, access to market or reputation which would cover and hopefully overcome certification implementation costs. A step forward is the FSC Ecosystem Service tool that allows to measure, report and claim ecosystem services – classified as biodiversity, carbon, water, soil and recreation – derived from active management (FSC, 2020). These verified positive impacts potentially open doors to payments for ecosystem services schemes and other market opportunities.

Furthermore, WWF published a Profitability and Sustainability in Responsible Forestry report (Breukink et al., 2015) where some recommendations for different forest certification actors were given and some of them could be interesting to consider implementing at the Portuguese context. The report encourages banks and investors,a mong others, to invest on sustainable management and certification. WWF suggests that financiers could benefit from reduced risk, regulatory compliance and long-term benefits.

6. Conclusions

The findings of this study conclude that FSC HCV approach contributes to the conservation of environmental and social values within certified forests in Portugal. HCVs are quite abundant within Portuguese certified areas, being identified in 62% of them, nonetheless the total area hosting HCVs corresponds to only 6% of the total certified area in the Country. These results corroborate the need to consider other metrics (besides the area) to measure the impact of the HCV approach. In this study it was decided to make reference to impacts and changes to the management regime of FSC certified organizations as a consequence of implementing the HCV approach for the aims of the FSC certification.

About 66% of the certified organizations surveyed considered the HCV approach in FSC certification to cause significant changes in their management activities, with a higher relevance perceived for those areas/aspects that are the core elements of the approach itself, i.e., environmental and cultural values identification, social and environmental impacts assessment, stakeholders' consultation and workers training. The NC analysis made clear that, on average, Principle 9 compliance amongst Portuguese certified organizations is high. This seems to indicate that HCV management is, all in all, feasible, but at the same time poses questions on the possibility to improve HCV management over time because certificate holders that are already in compliance with FSC requirements may not be encouraged towards extra efforts for HCVs.

FSC certification contributes to HCV conservation going beyond compulsory legal requirements that all forest managers are, in principle, requested to meet. In about half of the certificates HCVs are identified and *ad hoc* management measures adopted outside traditional and formally established protected areas.

Overall certificate managers consider the HCV approach to have a positive impact on the certified organizations, although, some weaknesses were pointed out, such as: the lack of standard reporting as well as the need for better guidelines/support for HCVs identification, stakeholders' participation and HCVs monitoring.

Despite our efforts to cover HCV impacts and associated across Portuguese certified forest areas, this study is far from exhaustive. Some methodological limitations of the research could be addressed by future studies, for example by integrating audit reports with additional secondary data sources. In addition, further research could be done at a larger scale, e.g. by developing a comparative study between countries within the same eco-geographical region or focusing on the perception of HCV approach impacts from the point of view of other stakeholders besides the certificate managers.

Regarding the HCV approach potentialities, the study pointed out possible improvement areas, especially regarding the approach implementation by certified organizations and certification bodies. An important improvement would be the standardization of the HCV reporting process within the broader framework of the audit reports, followed by the development of better guidance for the certified organizations with a specific focus on HCV identification and stakeholders' participation.

The FSC HCV approach is an interesting tool to enhance conservation in forest areas, but there is room for improving its application within the Portuguese (and likely global) certified forests. In this perspective, more applied research as well as stakeholders' insights are powerful to seize the approach potential.

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Annexes

Annex 1. FSC Portugal certificates data summary tables

Table A1. Certificate holders information from audit reports

Org ID	Company Name	Certificate Code	CertType	Members	SLIMF	Ownership	Management	Area (ha)	Area class	Main area class
1	2BForest Lda.	SA-FM/COC-005773	Group	240	Mixed group	Private	Private	8206,00	Mixed	<500
2	ACHAR - Associação de Agricultores de Charneca	SA-FM/COC-002301	Group	116	Mixed group	Private	Private	42199,53	Mixed	<500
3	AFLOBEI – Associação de Produtores Florestais da Beira Interior	CU-FM/COC-816719	Group	10	Non-SLIMF	Private	Private	13399,69	Mixed	500-1000
4	Associação dos Produtores Agro-florestais da Região de Ponte de Sor (AFLOSOR)	SA-FM/COC-002299	Group	6	Mixed group	Private	Private	8513,60	Mixed	NA
5	Altri Florestal S.A.	GFA-FM/COC-002454	Single	NA	Non-SLIMF	Private	Private	81699,85	>10000	NA
6	ANSUB – Associação de Produtores Florestais do Vale do Sado	CU-FM/COC-830905	Group	37	Mixed group	Private	Private	23291,01	Mixed	<500
7	APAS Floresta	SA-FM/COC-002029	Group	161	Mixed group	Private	Private	14799,69	Mixed	<500
8	APFC	SA-FM/COC-001873	Group	76	Mixed group	Private	Private	44662,00	Mixed	<500

9	Associação de Produtores Florestais dos Concelhos de Alcobaça e Nazaré	SA-FM/COC-005601	Group	239	Mixed group	Mixed	Private	2850,71	Mixed	<500
10	Câmara Municipal de Lisboa	SA-FM/COC-005033	Single	NA	Low-intensity	Public	State	955,12	500-1000	NA
11	Direcção Regional dos Recursos Florestais	SA-FM/COC-004293	Single	NA	Non-SLIMF	Public	State	3707,00	1000-10000	NA
12	EDIA, Empresa de Desenvolvimento e Infra – Estruturas do Alqueva, S.A.	SA-FM/COC-004679	Single	NA	Low-intensity	Private	Private	994,50	500-1000	NA
13	EGLON - TIMBERS, S.A.	SA-FM/COC-004658	Single	NA	Non-SLIMF	Private	Private	2836,19	1000-10000	NA
14	Floresta Atlântica - Sociedade Gestora de Fundos de Investimento Imobiliário, S.A.	SA-FM/COC-004184	Group	1	Non-SLIMF	Private	Private	3920,07	1000-10000	NA
15	FRUTICOR – Sociedade de Prestação de Serviços, SA	CU-FM/COC-835564	Group	11	Low-intensity	Private	Private	4461,99	Mixed	<500
16	Gesfloresta, Consultoria Lda.	SA-FM/COC-002594	Group	48	Mixed group	Private	Private	22493,06	Mixed	<500
17	Companhia das Lezírias, S.A.	SA-FM/COC-002659	Single	NA	Non-SLIMF	Private	State	8907,00	1000-10000	NA
18	Navigator Forest Portugal	SA-FM/COC-001785	Single	NA	Non-SLIMF	Private	Private	110107,00	Mixed	<500
19	Parques de Sintra - Monte da Lua, S.A.	SA-FM/COC-004977	Single	NA	Small	Public	State	488,73	<500	NA
20	Sociedade Imobiliária Trindade e Filhos S.A.	SA-FM/COC-005361	Group	4	Mixed group	Private	Private	3240,85	Mixed	<500
21	UNIMADEIRAS - PRODUÇÃO, COMÉRCIO E EXPLORAÇÃO FLORESTAL, S.A. – Grupo UniFloresta	SGS-FM/COC-005081	Group	687	Mixed group	Mixed	Mixed	19641,51	Mixed	<500

Table A2. HCV types presence and area in FSC forest certification in Portuguese certificates

Org ID	HCV1 presence	HCV1 area (ha)	HCV2	HCV2 area (ha)	HCV3	HCV3 area (ha)	HCV4	HCV4 area (ha)	HCV5	HCV5 area (ha)	HCV6	HCV6 area (ha)	HCV total area (ha)
1	0	2613,39	1	2613,39	0		0		0		0		2613,39
2	1	93,437	0		1	93,437	0		0		1	108,1	108,1
3	1	375,54	0		0		0		0		0		375,54
4	0		0		1	63,3	0		0		1	63,3	63,3
5	1	ND	0		1	ND	0		0		0		8908,91
6	1	1238,2	1	29,15	0		0		0		0		1267,35
7	1	1339,37	0		1	2,31	0		0		1	1336,68	1343,95
8	1	4553,14	1	2056,79	1	1348,79	0		0		1	2112,85	6079,44
9	0		0		0		1	159,61	0		0		159,61
10	1	955,12	1	955,12	1	955,12	1	955,12	0		1	955,12	955,12
11	1	3699,7	0		0		0		1	683,1	1	177	3699,7
12	1	504	0		1	ND	0		0		1	ND	994,5
13	1	4,43	0		0		1	4,43	0		1	4,43	4,43

14	0		0		0		0		0		1	79,57	79,57
15	1	59,23	0		1	10,33	0		0		0		69,56
16	1	541,09	0		0		0		0		0		541,09
17	1	51	0		0		0		0		0		51
18	1	985,18	0		1	517,87	1	202,74	0		1	ND	1505,35
19	0		0		0		0		0		1	298,46	298,46
20	1	97,88	0		0		0		0		0		97,88
21	1	3415	0		1	3415	1	66,14	0		1	83,34	3415

Table A3. List of HCV identified in Portugal FSC forest certification

Attribute name	Number of certificates	Number of entries	Attribute description
HCV1			
Alytes obstetricans	1	1	Endangered species, classified as HCV1.2
Aquila fasciata	4	4	Nest protection
Aquila heliaca	1	1	Vulnerable state at global level
Arceuthobium azoricum	1	1	Endemic species, classified as HCV1.2
Areas from List of National Sites	1	1	No specified areas
Areas with significant concentration of biodiversity values	1	14	Classified as HCV1.4
Azores laurissilva	1	1	Endemic habitat, classified as HCV1.3
Bufo bufo	1	1	Endangered species, classified as HCV1.2
Blanket bogs (only active bogs)	1	1	Endemic habitat, classified as HCV1.3
Caprimulgus europaeus	1	2	Vulnerable state at national level
Ciconia nigra	2	2	Nest protection
Chioglosa lusitanica	1	1	Endemic species
Chondostroma polylepis	1	2	Endemic species
Classified habitats oaks and shrubs	1	1	No specified habitats
Cynara tournefortii	1	1	Endangered species, classified as HCV1.2
Diphasiastrum madeirense	1	1	Endangered species, classified as HCV1.2
Echinodium renauldii	1	1	Endangered species, classified as HCV1.2
Emys orbicularis	1	4	
Endemic macaroni moorland	1	1	Endemic habitat, classified as HCV1.3
Fitomonuments	2	Several+1	Gesfloresta: remarkable Cork oak
Hieraaetus fasciatus	1	2	
Hot or sparkling mineralized water springs communities	1	1	Endemic habitat, classified as HCV1.3
Ionopsidium acaule	1	1	Endangered species, classified as HCV1.2
Jonopsidium acaule	1	1	Endemic species, classified as HCV1.3
Lutra lutra	1	3	
Lynx pardinus	3	9	Classified as HCV1.2 in one certificate.
Macro-moss communities of permanent streams / rivers of minerotrophic waters	1	1	Endemic habitat, classified as HCV1.3

Mauremys leprosa	1	1	
Migration corridor	1	1	Critical area of seasonal use, classified as HCV1.4
Narcissus bulbucodium ssp. Obesus	1	1	Endangered species, classified as HCV1.2
Natura 2000 areas	3	6	No specified Natura 2000 areas
Natura 2000 Habitat PTCON0044	2	2	Nisa/Lage da Prata
Natura 2000 PTZPE0045	1	1	
No specified bat species	1		Endangered species, classified as HCV1.2
No specified endemic species	2	2	Endemic species, classified as HCV1.3
No specified habitats	2	4	Protected habitats, classified as HCV1.1 in one certificate
No specified orchids listed on CITES	1		Endangered species, classified as HCV1.2
No specified rare plant species	1	14	
No specified threatened vertebrate species	3	3	
Nyctalus azoreum	1	1	Endangered species, classified as HCV1.2
Paúl de Boquilobo	1	1	Protection area because of natural reserve proximity
Platanthera micrantha	1	1	Endangered species, classified as HCV1.2
Pleurodeles watl	2	2	Endangered species, classified as HCV1.2 in one certificate
Prunus lusitanica subsp. azorica	1	1	Endangered species, classified as HCV1.2
Rhinolophus hipposideros	1	1	
Rumex azoricus	1	1	Endangered species, classified as HCV1.2
Ruscus aculeatus	1		Endangered species, classified as HCV1.2
Salamander salamander	1	1	Endangered species, classified as HCV1.2
São Miguel Island Natural Park (PNI)	1	1	Classified areas, classified as HCV1.1
Scabiosa nitens	1	1	Endangered species, classified as HCV1.2
Seasonal importance	1	2	For bats
Silene longicilia ssp. Cintrana	1	2	Endangered and endemic species, classified as HCV1.2 and HCV1.3
Smilax divaricata	1	1	Endangered species, classified as HCV1.2
Tejo International Natural Park	2	2	Areas with protection status given by the Plan of the Tejo International Natural Park.
Thamnobryum rudolphianum	1	1	Endangered species, classified as HCV1.2
Wooded peat bogs	1	1	Endemic habitat, classified as HCV1.3

HCV2			
Extensive forest areas	1	1	
Montado forest in Guadiana valley	1	1	
Natura 2000	1	4	No specified Natura 2000 areas
No specified	1	1	
HCV3			
***Alnetum glutinosa* ecosystem**	1	1	
Classified habitats of oaks and shrubs	1	1	Habitats no specified
Habitat 4030 Natura 2000	1	1	European dried heaths
Habitat 5330 Natura 2000	1	4	Pre-desert thermo-Mediterranean scrub
Habitat 6310 Natura 2000	1	3	Evergreen leaf *Quercus spp montados*
Habitat 91B0 Natura 2000	1	2	Thermophilic freixials of *Fraxinus angustifolia*
Habitat 91E0pt1 Natura 2000	1	2	Alluvial forests of *Alnus glutinosa* (riparian alder forests)
Habitat 9240 Natura 2000	1	1	Iberian oak forests with *Quercus faginea* and *Quercus canariensis*
Natura 2000 PTCON0044	1	1	Nisa/Lage da Prata
No specified habitats	4	5	
No specified rare ecosystems	1	1	
Riparian ecosystem	1	1	
Tejo International Natural Park	1	1	
ZPE Tejo International	1	1	
HCV4			
Catastrophe shelter and resource source	1	1	Lisbon Forest Park Monsanto
Dam protection	1	1	
No specified	1	1	
Soil conservation	1	1	Wind erosion protection
Water lines	1	1	
HCV5			
Springs	1	33	Fresh water springs
HCV6			
Archaeological values	3	9	
Built structures	1	3	No specified
Canal do Alviela	1	1	River channel
Castle	1	1	
Caves	1	1	

Chapel	3	3	
Forno da Cal	1	1	Property of Public Interest: 5 traditional ovens
Fountain	1	1	
Hermit	1	1	
Local communities traditional cultural identity	3	5	Areas critical to the traditional cultural identity of local communities: cultural, ecological, economic or religious.
No specified	1	17	
UNESCO World Heritage area	1	1	Cultural Landscape of Sintra (PCS)
Railway tunnel	1	1	
Trails	1	4	Hiking trails

Table A4. Non-conformities summary table for FSC certificates with HCV

OrgID	Period	MA	S1	S2	S3	S4	Total NC	HCV NC	Grade	Status	Standard reference
1	2017-2020	0	36	8	0	0	44	1	Minor	Closed	9.2.1
2	2019-2024	17	0	0	0	0	17	0	NA	NA	NA
3	2016-2021	0	0	0	0	0	0	0	NA	NA	NA
4	2019-2024	21	0	0	0	0	21	0	NA	NA	NA
5	2016-2021	0	0	2	6	0	88	0	NA	NA	NA
6	2019-2024	2	0	0	0	0	2	0	NA	NA	NA
7	2018-2023	13	14	0	0	0	27	1	Minor	Closed	9.1.1
8	2018-2023	12	11	0	0	0	23	0	NA	NA	NA
9	2017-2022	4	6	14	5	0	29	1	Minor	Open	9.4.1
10	2016-2021	31	2	3	1	0	37	3	Minor	Closed	9.2.1 9.3.3 9.4.1
11	2019-2024	4	0	0	0	0	4	0	NA	NA	NA
12	2015-2020	20	3	1	4	4	32	1	Minor	Closed	9.2.1
13	2020-2025	5	0	0	0	0	5	0	NA	NA	NA
14	2018-2023	2	5	0	0	0	7	1	Minor	Open	9.4.2
15	2015-2020	0	0	0	3	1	4	0	NA	NA	NA
16	2015-2020	0	0	0	7	5	12	0	NA	NA	NA
17	2015-2020	0	0	0	1	2	3	0	NA	NA	NA
18	2017-2022	0	0	8	0	0	8	0	NA	NA	NA
19	2016-2021	2	0	2	1	3	8	1	Minor	Open	9.4.2
20	2019-2024	34	0	0	0	0	34	2	Minor	Open	9.2.4 9.4
21	2018-2023	1	2	0	0	0	3	0	NA	NA	NA

Annex 2. Questionnaire for Forest Management Certificate Holders on impacts of the HCV approach to FSC® forest certification

1. Organization name

2. Contact person

3. What changes or activities were done under the HCV approach in FSC certification? Select from the following options and rate their importance between 1-5 (1-no changes, 2-minor changes, 3-neutral, 4-some changes, 5-major changes):

	Reforestation/aforestation requests		Ecological restoration actions
	Anticorruption policy implementation		Endangered species and habitats protection
	Work health and safety practices implementation		Forest Management Plan development
	Gender equality promotion in recruitment processes		Use of Geographic Information Systems (GIS)
	Workers training		Monitoring processes implementation/improvement
	Stakeholders consultation		Public information/reports
	Social impact assessment		Environmental values identification
	Ecosystem services identification		Cultural values identification
	Multiple-use forest promotion		Experts hiring
	Environmental impacts assessment		Invasive alien species control
	Conservation areas creation/delimitation		Pesticides use restriction

Other changes:

4. The concept of High Conservation Value was introduced by FSC in 1999, and encompasses biological, ecological, social and / or cultural values, which make forest ecosystems relevant in terms of conservation.
   Taking this definition into account, how would you describe the concept of High Conservation Values (HCV) in 3 words:

5. What are the HCVs present in your Forest Management Unit (FMU)? You can select more than one option (if applicable):

	HCV 1
	HCV 2
	HCV 3
	HCV 4
	HCV 5
	HCV 6

6. Do you consider the HCV approach to be a challenge for your organization's forest management activities?

	YES
	NO

7. How important were HCVs in the development of your organization's Forest Management Plan?
   Answer on a scale of 1 and 5, identifying your degree of importance (1 – no importance, 2 - little importance, 3 - neutral, 4 – some importance, 5 – big importance)

8. Do you consider that the HCV approach has caused changes in forest management and in your Organization's practices in general?
   Answer, on a scale of 1 to 5, identifying the degree of change in implementation (1 - no change, 2 - minor changes, 3 - neutral, 4 - some changes, 5 - major changes):

   8.1 If you have more than one HCV identified in the scope of your certificate, which or which HCVs have resulted in the most changes in forest management and in your Organization's practices?

9. What benefits do you think the HCV approach has?
   Answer on a scale of 1 and 5, identifying your degree of importance (1 – no importance, 2 – little importance, 3 - neutral, 4 – some importance, 5 – big importance)

	Social and environmental responsibility		Valuation by stakeholders
	Improved corporate image		Ecological restoration actions
	Forest management practices improvement		Threats identification
	Access to experts / specialists		Effectiveness in the conservation and protection of species and habitats

	Access to more scientific knowledge		Environmental impact assessment
	Conflict prevention		Social impact assessment
	Improvement in monitoring procedures		Implementation of pilot studies or conservation projects

Other benefits:

10. What disadvantages do you consider the approach to stroke has?
Answer on a scale of 1 and 5, identifying your degree of importance (1 – no importance, 2 – little importance, 3 - neutral, 4 – some importance, 5 – big importance)

	Direct costs		Devaluation by stakeholders
	Indirect costs		Limitation on management activities
	Excessive time spent in bureaucracy		Conflict management
	Difficulty in accessing information		Consultation with experts/specialists

Other disadvantages:

11. Are the HCV identified in the FMU protected by any other conservation tool, such as the Natura 2000 network or RNAP? Specify.

12. Do you have, had, or plan to develop a conservation project related to HCVs? If yes, specify.

13. Are you planning on renovating FSC certification once the current certificate expires?

	YES
	NO
	DON'T KNOW

13.1 If you answered yes in the previous question: Why are you planning on renovating FSC certification once the current certificate expires?

13.2 If you answered no in the previous question: Why are you planning on renovating FSC certification once the current certificate expires?

Other comments:
