IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 09 November 2017

Please note: this is an archived Conservation Outlook Assessment for Laurisilva of Madeira. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Laurisilva of Madeira

SITE INFORMATION

Country:
Portugal
Inscribed in: 1999
Criteria:
(ix) (x)

Site description:
The Laurisilva of Madeira is an outstanding relict of a previously widespread laurel forest type. It is the largest surviving area of laurel forest and is believed to be 90% primary forest. It contains a unique suite of plants and animals, including many endemic species such as the Madeiran long-toed pigeon. © UNESCO

SUMMARY

2017 Conservation Outlook

Significant concern

The site’s World Heritage values have so far been mostly preserved and remain stable although a progression towards more mature vegetation (climax forest) should be expected, and recently a few areas have been affected by fires. The site is facing a number of threats with invasive species being one of the most serious ones. A strong facilitation of alien species invasion by the effect of climate change shifting the upper and lower of limits of the forest is of great concern. Recent increase in tourist numbers also poses a management challenge. Significant uncertainties remain over the likely long-term impact of associated increasing water use, whose effects will likely be further affected by climate change. Management capacity (technical and scientific) insufficient and enforcement of many proposed management actions is hindered by lack of resources.

Current state and trend of VALUES

High Concern
Trend: Deteriorating

Although Laurisilva of Madeira has largely maintained its natural ecological and biological processes (in recent decades) , the increase in fire risk, the expansion of invasive species, the increase in water demand, and the increase in human usage (mainly tourism and infrastructure development) all pose serious threats. Several plant and vertebrate species seem to present stable population trends, but for most species there are no consistent data (due to lack of monitoring projects). There is an urgent need to develop specific surveys and scientific studies for invading species, threatened plants, bats and invertebrates. Recent fires lead some species almost to extinction (Taxus baccata, Sorbus maderensis and Juniperus cedrus) affecting mainly higher altitudes.

Overall THREATS

High Threat

The difficult access to the core areas of Laurisilva of Madeira and long history of protection have so far resulted in generally low levels of impact. However, the site is currently facing a number of threats. Prospects of land-use changes might further exacerbate these threat if protection and management do not account for these. Special attention should be given to expansion of invasive alien species and forest fires. Construction of new roads or cover with asphalt of the old dirty roads presents a potential threat due to increasing visits in sensible areas and it also facilitates dissemination of invasive alien species.

Overall PROTECTION and MANAGEMENT

Some Concern

The Regional Authority has developed some management tools and the site has a good management plan, but its full implementation is somewhat hindered by budget constraints and lack of resources, the recent merge of the SPNM and DRFCN as IFCN should enhance a future better enforcement. Many threats, particularly forest fires, invasive species, tourism increase require significant additional measures and their effective implementation. Funds transferred from the Autonomous Regional Government of Madeira are largely insufficient leading to a limited enforcement of management measures. Recent fires (since 2010) and their spread to some areas within the property are related to limited management actions such as the removal of invasive species Staff numbers of the newly created IFCN are insufficient, and the absence of “Sapadores florestais” (Forest firefighters) reduces management efficiency. The current funding instruments and measures (regional budget, European funds, etc.) are insufficient both for current and future needs of preservation and conservation of the site. Madeira tourism stakeholders need to be involved in the financial sustainability of the IFCN. Current human resources are insufficient to allow for effective surveillance. (Laurissilva Madeira Management Plan, 2009), and staff related to direct conservation actions, is reduced to a few men. Sustainability of many uses of the property need to be thoroughly assessed, including tourism and water use, the unlimited removal of water (and actions taking place inside the property related to the management of water channels). The recent increase

in tourism visitation also represents a management challenge.

FULL ASSESSMENT

Description of values

Values

World Heritage values

► **An outstanding relict of a previously widespread laurel forest type**
Criterion:(ix)

The Laurisilva of Madeira is an outstanding relict of a previously widespread laurel forest type, which covered much of Southern Europe 15-40 million years ago. The forest of the property completely covers a series of very steep, V-shaped valleys leading from the plateau and east-west ridge in the centre of the island to the north coast. The forests of the property and their associated biological and ecological process are largely undisturbed, and play a predominant role in the island´s hydrological balance. The forest is mainly comprised of evergreen trees and shrubs, with flat, dark green shiny leaves. The property provides a wealth of ecological niches, complex food webs and examples of co-evolution of species. A range of climax vegetation communities such as the "Til Laurisilva", the "Barbusano Laurisilva" and the "Vinhático Laurisilva", have been identified within the property. Ancient trees in the valley bottoms, waterfalls and cliffs add to the experience of the values of the property (SoOUV, 2010). As well as many microhabitats found within the forest, namely: epiphytic communities; communities of shady earthy walls; shady wet rock walls. Also of importance are caulirosetted communities associated with landslides within the forest and rocky ground of small streams. Streams may hold both madeiran elder (Sambucus lanceolata) community and ebony riverine forests of Persea indica or a willow community of Salix canariensis (see Capelo et al., 2005).

► Rare and endemic plants

Criterion:(x)

At least 76 vascular plant species endemic to Madeira occur in the site. Endemic trees belonging to the Lauraceae family predominate such as Canary Laurel Apollonias barbujana ssp. barbujana, Laurel Tree Laurus novocanariensis, Madeira stink Laurel (Til) Ocotea foetens, Madeira Mahogany Persea indica, Clethra arborea, Ilex perado subsp. Perado or Heberdenia excelsa. Of the endemic shurbs, particularly interesting are the Pride of Madeira Echium candicans, Honey Spurge Euphorbia mellifera, Madeira Foxglove Isoplexis spectrum, Musschia wollastonii, Sonchus fruticosus, and Melanoselinum decipiens as well as Erica platycodon subsp. maderincola. Bryophythes and lichens are abundant and some species are indicative of high environmental quality and the absence of pollution. Of its large bryophyte flora, 13 liverwort species and 20 moss species are listed as rare or threatened on a European scale (SoOUV, 2010).

► Rare and endemic vertebrates

Criterion:(x)

The vertebrates include a limit number of species and a high rate of endemics, including two rare taxa of bats, Madeira Pipistrelle Pipistrellus maderensis and Leisler’s Bat Nyctalus leisleri verrucosus and several birds, such as Madeira Laurel Pigeon Columba trocaz, Madeiran Firecrest Regulus madeirensis and the Madeiran Chaffinch Fringilla coelebs madeirensis. There is also an endemic species of lizard Madeira Wall Lizard Lacerta dugesii (SoOUV, 2010).

► Rare and endemic invertebrates

Criterion:(x)

The invertebrates are apparently more discreet although much more numerous. There are more than 500 endemic species, ranging from molluscs, to arachnids and insects (SoOUV, 2010; SPNM, 2004). The wolf spider Lycosa blackwalli is endemic to the forest (SoOUV, 2010). About 20% of the nearly 3000 known species of insects are endemic (Laurissilva Madeira Management Plan, 2009).

Other important biodiversity values

► Important habitats

Laurissilva of Madeira includes 4 Natura 2000 habitats with two of them classified as priority. The habitats are: i) (code 1250) vegetated sea cliffs with endemic flora of the Macaronesian coasts; ii) (code 4050) endemic macaronesian heaths – priority habitat; iii) (code 5330) thermo-mediterranean and pre-desert scrub; iv) (code 9360) macaronesian laurel forests – priority habitats (ETC/NB, 2010). Also, in the Red List of Habitats of Europe report, the exclusive madeiran EUNIS habitat types G2.3 ‘Macaronesian laurophyllous woodland’ and G2.7 ‘Macaronesian heathy woodland’ are assessed as ‘VU – Vulnerable, both mostly due to the A3 criteria (historic area reduction). The Natura 2000 network includes, in the scope of Laurisilva: 4 small-area SCIs (546 ha) and most important ‘Laurisilva of Madeira’ encompassing 15.462 ha that are simultaneously SAC and SPA (Special Areas of Conservation and Special Protection Area respectively); ‘Central Mountain Massif of Madeira’, with a great deal of Laurisilva forest of which 8.212 ha are SAC and 3.050 are SPA.

Assessment information

Threats

Current Threats

High Threat

The difficult access to the core areas of Laurisilva of Madeira and long history of protection have until recently resulted in generally low levels of impact in these core areas.
However, the site is currently facing a number of threats.
Laurisilva of Madeira is a very humid forest but the presence of invasive plants both at the lowest limit of this natural forest and already inside it in many

reported cases allied with increasing temperatures, presents risk for the occurrence and increased area of forest fires, the uncertain behaviour of forest communities related to decrease water availability (increase human usage) should also be a strong concern in this regard. Recent fires (2010 to 2016) proved that local fire fighters are not prepared for competently fight against forest fires, in extreme situation special corps coming from the mainland proved to be fundamental for preventing further damage. The expansion of invasive alien species inside the property also threatens the indigenous vegetation, destroying natural habitats either directly by habit use or indirectly by changing forest fire behaviour.

The maintenance of certain exotic species constitutes an important threat to Laurissilva and limit the normal development and regeneration of the forest. Grazing both by cows and rabbits although in many cases restricted to border areas have recently expanded. Both the building of a dam (close to Rabaçal) and maintenance of water channels (levadas) and trails do not take into account native/endemic species and potential expansion of exotic species. The synergic effects of both fire, spread of invasive species, grazing proved to be a threat of unpredictable future effects. At same time, both traditional and new activities affect both forest succession (through wood cutting), and are causing erosion, affecting formerly well preserved habitats and contributing to invasive species spread (increase in extreme sport activities, such as trail-running, bike, crayoning.

► Dams/ Water Management or Use

Low Threat
Inside site, throughout(>50%)
Outside site

The keeping of the water channels and the renewal of trails is proved to be a direct cause of tree/shrub cutting but also a way in for invasive plants. Levadas are “highways” for the introduction of different species inside laurel forest. (IUCN Consultation, 2014; R1-R23). Also, ornamental garden alien species are introduced long the channels by maintenance workers that might pose invasion risks. There are several examples of destruction of endemic plant populations including orchids and the Madeiran endemic Sonchus fruticosus (among many others) by workers of the company responsible for

the preservation of the water channels.

► Avalanches/ Landslides, Earthquakes/ Tsunamis

Low Threat
Inside site, scattered(5-15%)

Although some landslides are accidental many can be linked to human activities such as levadas, roads, trails etc. Water transport by water channels sometimes results in accidents with the breakdown of these channels and enormous amounts of water running freely on climax laurissilva forest (R1-R23; IUCN Consultation, 2014). Recent studies have also proven the high risk of landslides in areas covered by invasive species such as Acacia mearnsii and Cytisus scoparius, and therefore a synergic link between distinct threats (Figueiredo, Pupo-Correia & Sequeira 2013, 2016). Reducing the probability of channel breaking is a matter of enhancing the engineering techniques, namely guaranteeing that overflows during heavy rainfall are fed by auxiliary channels to the extant natural streams only and not to the forest soil.

► Dams/ Water Management or Use

High Threat
Inside site, throughout(>50%)
Outside site

Increasing water demand both for urban growth (mainly driven by tourism) and agricultural purposes. The building of new “levadas” or other types of water collection systems, or even building of dams (to be constructed in the Rabaçal area in 2018, https://www.eem.pt/pt/conteudo/eem/projetos-recentesem-curso/amplia%C3%A7%C3%A3o-do-aproveitamento-hidroel%C3%A9trico-da-calheta/barragem-do-pico-da-urze/) not only will have a direct impact, but will further reduce the input of water into the forest, which will result in long term changes in forest composition (shifting towards dryer forest communities) but will also result in increased risks of forest fires possibly increasing susceptibility and fire expansion. The movement of earth, rocks, and debris of any kind inside the property associated with the construction of this infrastructure will increase risks of invasion by exotic species. The planned deposit of thousands of tons of earth rock and debris in areas in the close border to the property (inside RN2000

area) is a major cause for concern.

▶ Invasive Non-Native/ Alien Species

Very High Threat
Inside site, throughout(>50%)
Outside site

The presence of invasive plants at the lowest limit of this natural forest, in the transition zones and on former agricultural land, endangers its regeneration and expansion, leading to areas of deterioration and of replacement of the indigenous flora, constituting a serious threat to the balance and consequent permanence of this habitat (SoOUV, 2010). Invasive species represent a high threat to the site’s values and authorities have insufficient capacity to fight this threat. The expansion of invasive species limits natural regeneration of accidentally destroyed areas, e.g. fire recovery. In the upper limits the spread of Cytisus scoparius has created a link between formerly isolated areas, i.e. forestry/agricultural on the south and laurissilva on the north (IUCN Consultation, 2014; R1-R23). The recent spread of some invasive species such as Leptospermum scoparius, Cyathea cooperi or Psidium littorale (among many others) poses a new challenge to management since these plants are able to colonize close to climax communities.

▶ Invasive Non-Native/ Alien Species

Data Deficient
Inside site, localised(<5%)
Outside site

In some Ribeiras rainbow trout is found, a species introduced in the middle of XX century and one of the 100 most invasive species on the planet. The impacts on freshwater organisms, namely macroinvertebrates are unknown, but probably very serious (IUCN Consultation, 2014).

▶ Invasive Non-Native/ Alien Species

Data Deficient
Inside site, widespread(15-50%)
Outside site

Although rabbit populations suffer from high fluctuations caused by periodic epidemic episodes (e.g. myxomatosis), they are affecting the regeneration of

the forest mainly in areas covered with secondary forest (recent agriculture or grazing, fire).

► Renewable Energy

Data Deficient
Outside site

The increased presence of wind mills not only disturbs the landscape integrity, but possibly also impacts on the fauna (IUCN Consultation, 2014).

► Roads/ Railroads

High Threat
Inside site, scattered(5-15%)
Outside site

Road maintenance includes not only the uncontrolled cutting of edge/border vegetation, but also the planting of exotic invasive species (Agapanthus praecox, Hydrangea sp. etc.) (IUCN Consultation, 2014; R1-R23) (Abreu 2015).

► Logging/ Wood Harvesting

Low Threat
Inside site, scattered(5-15%)
Outside site

Wood cutting mainly of Erica spp. for traditional agricultural uses keeps human pressure at relatively high levels in many secondary vegetation areas, therefore limiting their ability to recover to more mature forest stages.

► Fire/ Fire Suppression

Very High Threat
Inside site, throughout(>50%)
Outside site

The forest fires that occurred in 2010 burnt part of the Laurissilva forest in Ribeiro Frio and Fajã da Nogueira. The forest fires in 2012 also burnt a significant area of Laurissilva (40 ha in Terra Chã), and the consequences of this destruction have not been evaluated (Personal communication, 2012). This threat has been increasing over the recent years. Because of the difficult access to areas inside Laurissilva of Madeira and lack of resources (e.g. lack

of helicopters) there is low capacity to fight fires when they occur. The expansion of invasive fire-prone species that are now linking the south slope of the island and the forest site areas as well as the expansion of many fire-prone invasive species inside the area itself strongly increase the risk of fire. Climatic changes will also directly and indirectly increase the risk of fire (IUCN Consultation, 2014; R1-R23). The 2016 fires proved that criminal acts can directly affect areas of protected landscape. In the absence of local firemen properly equipped and trained for forest fires the arrival of special corps of firemen from the mainland permitted a more efficient fight against the uncontrolled fire, preventing further damage to the property.

► Tourism/ visitors/ recreation

High Threat
Inside site, scattered(5-15%)
Outside site

Many areas appear to be used beyond their carrying capacity (Rabaçal, Ribeiro Frio are examples of over-exploited areas).
This use results both in deposit of several kinds of garbage has well as human faeces along trails that cross the best preserved parts of the property. The effects of such overcrowding on bird populations has not been studied, several aspects should be analysed, including noise and feeding of endemic birds.
Seeds brought and left by tourists on the ground could facilitate invasion of new exotic species.
Tourism increase is also linked to increased water demand, road building, new tracks etc.

► Tourism/ visitors/ recreation

High Threat
Inside site, scattered(5-15%)
Outside site

The recent expansion of use of forest and other areas by people practicing “nature sports” could prove to be unsustainable, in fact in some major sport events hundreds and in some cases thousands of people go through formerly otherwise scarcely used walks (or new ones), the effects of such highly intense use needs to be studied. (https://vimeo.com/115958262 or https://youtu.be/BCtrd90_6bg). The use of special and sensitive habitats such

as waterfalls (covered with peculiar plant communities) for canyoning was not evaluated and will certainly prove some (variable) degree of habitat destruction (fragments of bryophytic communities are seen in some promoting videos floating around the tourists as a result of such activities). The uncontrolled opening of new bike tracks and the use of forest for downhill and free downhill is of high concern as well (https://youtu.be/pGELw4qEr9o; https://www.pinkbike.com/news/Madeira-The-undiscovered-MTB-paradise-Video-2014.html.

► Temperature extremes

Low Threat
Inside site, widespread(15-50%)
Outside site

Recent studies prove that some temperature changes can already be detected. Temperature changes (increases) lead not only to long term ecosystem shift, loss of ecosystem resilience, loss of quality or even collapse, but also to increased fire risk (R1-R23).
The displacement in altitude of mesic ecosystems will lead to the extinction of Mountain ecosystems and consequently also to the extinction of cacuminicolae endemic species (Figueired & Sequeira, 2012).

► Other Biological Resource Use

Low Threat
Inside site, scattered(5-15%)

The massive use of flowers or parts of plants (for exhibits) or of branches (of Laurus sp., Semele sp.) for using in traditional festivities, or also the collecting of mosses for using in Christmas related events, is a cause for concern (IUCN Consultation, 2017).

► Livestock Farming / Grazing

Data Deficient
Inside site, scattered(5-15%)
Outside site

Although goats had previously been mostly removed cows have been recently re-introduced and cow grazing marks are common (IUCN Consultation, 2014). Cow grazing in the higher mountains and frontier areas facilitate the spread of invasive species and are linked to fire risk. Also, cows

destroy soil structure and add excess nitrogen. This will largely favour cosmopolitan vegetation types that replace high-value former vegetation to collapse of ecosystem and critical flora population reduction (IUCN Consultation, 2017). In core areas there are examples of permitted grazing by cows that are affecting the forest and all plant communities at the landscape scale. Recently there have been several attempts to reintroduce goats mainly in high mountain areas reverting the removal process that took place (2000-2004). Motivation for this re-introduction is the associated fuel-bed reduction to diminish the risk of wildfire. Although goat-grazing is a useful management tool for some types of vegetation, it has to be monitored as goats are woody shrub and tree eaters (IUCN Consultation, 2017).

Potential Threats

High Threat

Some concerns have been previously expressed with regard to the construction of Rabaçal cable car (SOC Report, 2009), particularly since its potential impacts on the Outstanding Universal Value of the site were not evaluated during the environmental impact assessment procedures. The construction of a dam not far from Rabaçal is at the same time a real and potential threat (it will be constructed in 2018, although some activities are already taking place). The construction of new roads or cover with asphalt of the old dirty roads also presents a potential threat due to increasing visits in sensible areas and it also facilitates dissemination of invasive alien species. In fact many potential threats correspond also to actual threats; tourism increase will lead to an increase in water demand and indirectly will affect the property. Other activities, including agriculture, will also affect the water balance of the forest by further increasing water demand. Threats of new invasive species introductions are strongly linked to the absence of control entry mechanisms; the possible introduction of plant diseases capable of affecting native/endemic plant species is also cause for concern. Although goats have been eliminated from the mountains of Madeira with spectacular results in terms of biodiversity and ecosystem recovery, recent appeals for the return of free grazing had a political reception that is a clear cause for concern. There is no doubt a potential threat of the spread of common cats; this expansion is strongly linked to changes in animal welfare laws that had an unexpected effect on the

limitation of control and elimination.

▶ Tourism/ Recreation Areas, Roads/ Railroads

Low Threat
Inside site

The “valorisation of the area of Rabaçal” that is an initiative for conservation and sustainable use, includes a cable car project. The project covers a small area at the outskirts Laurissilva of Madeira and includes three stations, two sections of cable car of 705 and 674m in length requiring four towers and four transport cabins for passengers and cargo. Of the three stations, only one will be located within the boundaries of the property in an area which is a starting point for tourist activities (EcoMind, 2010; SOC report, 2010).

▶ Tourism/ visitors/ recreation

High Threat
Inside site, widespread(15-50%)
Outside site

The impact of tourists is already high threat, recent publications show that the impact of tourists cannot be neglected. In some areas there are several hundreds of visitors a day, possibly a thousand in pick days. Further increase in tourism might lead to serious impacts on the site (R1-R23).

▶ Roads/ Railroads

Low Threat
Inside site
Outside site

The site used to be bisected by two roads running north-south (IUCN Evaluation, 1999). Despite the construction of the tunnel in São Vicente, the road is still in use.
In 2003 an old dirt road that connects Ribeira da Janela to the plateau Paul da Serra was covered with asphalt. Besides this there is a proposal to cover with asphalt another road that connects São Vicente (Ginjas) to Estanquinhos, also in the plateau Paul da Serra (Personal communication, 2012).

▶ Invasive Non-Native/ Alien Species

High Threat

Inside site, widespread(15-50%)
Outside site

The uncontrolled use of species (introduced in Madeira by different means including horticultural, forestry enterprises, gardening, etc.) is no doubt a serious reason for concern; invasive species usually demonstrate their real danger after a long period of adaptation. Therefore many new species that were recently detected as naturalized exotics can soon become troublesome.

▶ Livestock Farming / Grazing

Data Deficient
Inside site, widespread(15-50%)
Outside site

Recent pressures by former owners of free grazing goats has led to some political discussions regarding a possible revision of former laws and regulations that permitted goat removal from mountain areas

▶ Invasive Non-Native/ Alien Species

Data Deficient
Inside site, scattered(5-15%)
Outside site

At least a few new phytopathogens were recently detected on Persea americana (avocado) clearly indicating the possibility of agricultural plagues to spread to native species (Persea indica a major component of Laurissilva belongs to the same genus)

▶ Invasive Non-Native/ Alien Species, Modified Genetic Material

Data Deficient
Inside site, scattered(5-15%)
Outside site

The recent approval of national and regional (Madeira) laws related to animal welfare including cats and dogs is leading to an uncontrolled spread of common cats. Large numbers can be seen in some of the more important trails in Madeira (such as Queimadas), their effects on native birds are not studied but common cats are known to be an important threat to both birds and bats.

► Invasive Non-Native/ Alien Species

Data Deficient
Inside site, scattered(5-15%)
Outside site

The recent spread of exotic birds such as Estrilda spp., Psittacula spp., Nymphicus spp. and Poicephalus spp. could become a threat to native birds and indirectly lead to habit changes etc.

► Habitat Shifting/ Alteration

Data Deficient
Inside site, extent of threat not known
Outside site

Madeira's climate is largely influenced by the Trade winds (vientos alisios), a shift in the wind patterns (which is expected with climate change) will have a large influence on water availability. Trade winds are responsible for the sea of clouds in Madeira which allow the establishment of laurisilva forest by providing high humidity in an otherwise dry environment (https://www.cbd.int/islands/doc/idr/Climate%20Change%20and%20Biodiversity%20in
es.pdf).

Protection and management

Assessing Protection and Management

► Relationships with local people

Serious Concern

Although the site is largely uninhabited and uncultivated (approximately 500 people live in the buffer zone) (SoOUV, 2010).
The municipalities that comprise in the area have low population density and reveal an elder population. In these municipalities the agriculture (including cattle) and forestry activities still have some importance in the economic and social structure. There is a clear conflict of interests between local property and local (traditional) uses and tourism and tourism benefits. In fact more than 95% of income (hotels, restaurants, car rentals, nature guides, etc.)

goes to Funchal (and close municipalities), leaving the resposability (and consequent use limitations) to the northern municipalities and the income for the southern ones.
The main difficulty with local population regarding site management was the problems with shepherds when the government authorities started to remove free grazing goats and with farmers who gets their crops damaged by Madeira Laurel Pigeon, which led to killing of some pigeons (Laurissilva Madeira Management Plan, 2009). The increase and movement pigeon populations to agricultural fields leads periodically to complaints on losses due to destruction (sometimes complete!) of cultures. An efficient system of compensation (economic) for agricultural losses needs to be urgently implemented therefore changing the view of stakeholders in what concerns pigeon population growth. Annually hundreds of pigeons are eliminated by local armed guard (Policia Florestal) which is clearly insufficient as a measure and politically complex and is not being monitoring. Recently there has been an attempt to reintroduce goats in the high mountains, unfortunately with some acceptance by local politicians.

► Legal framework

Mostly Effective

The legal framework for the site is sufficient. The site has strong and effective legal protection under regional, national and European Law. The property is gazetted under Madeiran law, with around half of the area as a Strict Reserve and the remainder as a Partial Reserve (SoOUV, 2011).

► Enforcement

Some Concern

Enforcement measures have been carried out by forestry police (Regional forestry department) and by wardens from Madeira Natural (Laurissilva Madeira Management Plan, 2009). However, current levels of enforcement could be enhanced (IUCN Consultation, 2014). The recent merge of the SPNM and DRFCN as IFCN should enhance a better enforcement.

► Integration into regional and national planning systems

Highly Effective

The site is under the Habitats Directive and Birds Directive of the European

Union (adapted to regional law nº5/2006/M of 2nd March) and since 1992 is also a Biogenetic Reserve of the Council of Europe.
It is a Nature 2000 Network Site, since it is a Special Area of Conservation (SAC) and a Special Protection Area (SPA) (adapted to national law ordinance nº829/2007 of 1st August) (SoOUV, 2011; Laurissilva Madeira Management Plan, 2009).

► Management system

Mostly Effective

Recently the former “Direcção Regional de Florestas e Conservação da Natureza” and “Serviços do Parque Natural da Madeira” have been merged into a new structure - IFCN (Instituto das Florestas e Conservação da Natureza) therefore concentrating management responsibilities in one sole public institute, leading consequently to gains in capacity and potentially larger financial resources (https://ifcn.madeira.gov.pt).

The Management Plan for the Laurisilva Forest was approved by the Regional Government in 2009. This document defines the strategies and objectives for the protection and enhancement of the Laurisilva of Madeira, drawing the main guidelines for its management, conservation and protection (SoOUV, 2010).
Before the approval of this management plan, several key stakeholders were invited to give inputs and improve strategic objectives.
There is a monitoring program that aims to ensure regular evaluation of the implementation of measures and actions proposed in the LM management plan, so it can be assessed the degree of achievement of the proposed objectives and performance (environmentally, social and economic) of all activities and operations developed (Laurisilva of Madeira Management Plan, 2009), however, there is no independent management effectiveness monitoring system in place (IUCN Consultation, 2014) and the evaluation of management system (and effectiveness) is undertaken by the same structures/authorities that are responsible for the management of the property.

► Management effectiveness

Serious Concern

Funds transferred from the Autonomous Regional Government of Madeira are largely insufficient to ensure an effective management. The limited allocation of funds is leading to a limited enforcement of management measures. The total removal of free grazing goats in 2003 allowed the restoration of habitats and associated species (Laurissilva Madeira Management Plan, 2009). The impacts of recent fires (happening in the last 10 years) and the advance of invasive species raise some concerns regarding management effectiveness. The number of staff is insufficient, and the continuously postponed creation of a unit of "Sapadores florestais" reduces management activities.

► Implementation of Committee decisions and recommendations

Mostly Effective

Regarding the construction of the cable car at Rabaçal, the State party provided as requested a detailed report and the environmental impact assessment (EIA).
The State Party also replied to questions regarding Laurisilva Pigeon culling (SOC report, 2010)

► Boundaries

Some Concern

The property includes the best preserved areas of Laurisilva on Madeira. Its boundaries were defined after an exhaustive field study to identify the most significant areas of remaining vegetation (SoOUV, 2010). The whole site is enclosed within the Madeira Nature Park, which was established around 1990 as a large Category V site. However, the emphasis of management is almost entirely on the Laurisilva, which is managed as Category I and II (IUCN Evaluation, 1999). The integrity of the property should be further enhanced by buffer zones that are not part of the inscribed property but should function to protect it from threats originating from outside its boundaries (SoOUV, 2010).
Nevertheless according to Laurissilva Madeira Management Plan (2009) there is a clear need for clarification of the limits of SAC Laurisilva Madeira and associated description so the management and protection of its natural values can be more effective.

► Sustainable finance

Serious Concern

The current funding instruments and measures (regional budget, European funds, etc.) are largely sufficient both for current and future needs of preservation and conservation of the site.
The regional government will need to allocate new funds to promote the replacement of exotic vegetation in the transition zones of Laurissilva, as well as other activities, such as the removal of invasive species inside the property.
There are some possibilities to obtain additional funding such as European funds; revenue from merchandising; fundraising through thematic campaigns, via donations from visitors or sponsor by companies; payment of fees (Laurissilva Madeira Management Plan, 2009). However, the engagement of stakeholders involved in tourism activities in the financial sustainability of the IFCN is also needed. In fact although these stakeholders recognize the forest laurissilva as their main asset (http://estrategia.turismodeportugal.pt/sites/default/files/Doc_Estrategico_Turismo_RAM their direct contributions to conservation projects have been absent . The increase in use and simultaneously the degradation of used infrastructure (such as trails) lead to the confusion between tourism infrastructure maintenance and nature conservation, in fact preserving and enhancing such infrastructure leads to
an increase in use.

Eradication of invasive species also requires additional measures, and thus additional resources.

► Staff training and development

Serious Concern

Current human resources are sufficient to allow for effective surveillance. (Laurissilva Madeira Management Plan, 2009).
Wardens from Madeira Natural Park and forestry police from forestry department have capability and adequate training to develop conservation with support from technical staff as well to ensure surveillance. But there is

an urgent need to add new agents. Staff related to direct conservation actions, such as invasive species control, forest management (in border areas) fire prevention and forest fire fighting is reduced to a few men (mostly over 55 or 60 years old).

► Sustainable use

Serious Concern

The Laurisilva of Madeira Management Plan (2009) presents several ideas to improve the use of the site by visitors, promoting its sustainable use. This includes the improvement of leisure infrastructure, reception and environmental interpretation center, improvement of footpaths, etc. However there are some concerns that these activities might not be sustainable, first of all because of the lack of studies concerning sustainability and ecological effects of “nature tourism. The water management should take into account forest conservation, the increasing demand for water, the expansion of water collecting systems (including the building of a dam).

► Education and interpretation programs

Some Concern

There is an education programme that enhances the understanding of values of the site which identify the target audience, the topics to be discussed as well the activities to be developed in order to promote the involvement of local population and visitors on site management.
There is also promotion of the regulations about the adequate use of the site. There is still a need to promote the site on internet with information in several languages (Laurisilva Madeira Management Plan, 2009).

► Tourism and visitation management

Serious Concern

There is some promotion of the site’s natural values in local and national tourism policies and there exists some tourism infrastructure with information for all visitors.
However it’s necessary to develop a medium-term strategy for sustainable tourism. An action plan is required to achieve specific objectives such as monitoring of the impact of tourism on the fauna and flora, promotion of cultural and historic activities, control or reduction of activities that affect the

quality of the landscape, water, soil, etc (Laurissilva Madeira Management Plan, 2009).

The recent increase in tourism visitation represents a management challenge and there is a need to ensure that tourism-related revenues also generate financial contributions to nature conservation projects.

► Monitoring

Some Concern

A few of the natural values of Laurisilva of Madeira are adequately and systematically monitored through the development, since 1986, of several projects, such as monitoring of Madeira Laurel Pigeon. These projects have been developed by regional entities (forestry department and Madeira Natural Park) sometimes associated with academic or research centers. The last management plan approved in 2009 was improved based on these monitoring projects (Laurisilva Madeira Management Plan, 2009). However, certain monitoring gaps exist, e.g. monitoring of the effects of goat removal (IUCN Consultation, 2014). In addition, implementation monitoring programme involvinga permanent set of plats designed to obtain a through and independent follow up is absent, and particularly the speed of expansion and the appearance of new invasive species are not being properly monitored.

► Research

Mostly Effective

Various studies have been developed by academic or research centers in collaboration with regional entities namely forestry department and Madeira Natural Park (Laurisilva Madeira Management Plan, 2009). Extensive scientific research has been conducted by the University of Madeira. However, for some taxa there are still significant knowledge gaps.

Overall assessment of protection and management

Some Concern

The Regional Authority has developed some management tools and the site has a good management plan, but its full implementation is somewhat

hindered by budget constraints and lack of resources, the recent merge of the SPNM and DRFCN as IFCN should enhance a future better enforcement. Many threats, particularly forest fires, invasive species, tourism increase require significant additional measures and their effective implementation. Funds transferred from the Autonomous Regional Government of Madeira are largely insufficient leading to a limited enforcement of management measures. Recent fires (since 2010) and their spread to some areas within the property are related to limited management actions such as the removal of invasive species Staff numbers of the newly created IFCN are insufficient, and the absence of “Sapadores florestais” (Forest firefighters) reduces management efficiency. The current funding instruments and measures (regional budget, European funds, etc.) are insufficient both for current and future needs of preservation and conservation of the site. Madeira tourism stakeholders need to be involved in the financial sustainability of the IFCN. Current human resources are insufficient to allow for effective surveillance. (Laurissilva Madeira Management Plan, 2009), and staff related to direct conservation actions, is reduced to a few men. Sustainability of many uses of the property need to be thoroughly assessed, including tourism and water use, the unlimited removal of water (and actions taking place inside the property related to the management of water channels). The recent increase in tourism visitation also represents a management challenge.

▶ **Assessment of the effectiveness of protection and management in addressing threats outside the site**

Serious Concern

Laurisilva of Madeira Management Plan (2009) includes measures and operational plan to prevent threats from external factors such as forest fires, diseases, alien species and high numbers of daily visitors. However, implementation of these measures is currently insufficient (IUCN Consultation, 2014). The conflict of interests between local property and local (traditional) uses and tourism and tourism benefits, results in an unbalanced distribution of profits and responsibilities that needs to be addressed. Another aspect that needs urgent solution is the negative view of local farmers (on the boundary or outside the property) in what concerns nature conservation due to losses related to massive destruction of agricultural fields by the pigeon. Other activities undertaken in areas bordering the property are putting it at risk, e.g. cattle grazing. The increase in areas

populated by invasive species outside the property and their change towards more fire-prone vegetation represents a threat to the property, as shown by recent fires which started at its border or even relatively far from the property but then spread into the site. Water demand for both use and agriculture and an increasing pressure on water collecting structures lead to an increase in water collected from the property.

► **Best practice examples**

Recent good practices include: strong Christmas campaigns to limit moss collection ion the wild (2015-2016) , Re-introduction of surveillance towers on the fire surveillance system (2015-), new approach to fire risk and fire surveillance (by the IFCN). The renewal of structures related to the forestry guard’s activities (including surveillance towers and forestry police stations) The recent elaboration of the PROF-RAM (Plano Regional de Ordenamento Florestal da Região Autónoma da Madeira) could prove to be an important management tool for the territory including (and most important) for the areas at its boundaries.

State and trend of values

Assessing the current state and trend of values

World Heritage values

► **An outstanding relict of a previously widespread laurel forest type**
High Concern
Trend:Deteriorating

Although Laurisilva of Madeira was considered for a long time a stable ecosystem that maintained its natural ecological and biological processes, the fact is that recent studies clearly show that it is mostly an evolving ecosystem that benefited from agriculture abandonment and changes in forest uses (eg. Cutting for charcoal). Regarding climate change effects on the forest, some predictions suggest an increased potential productivity of Laurisilva and the expansion of its distribution area, and further suggest that in the long-term natural forest will be present in areas of higher elevation

(Santos & Aguiar, 2006), however these models might not have considered all factors. Other authors suggest a different view (Figueiredo & Sequeira, 2016; 11, 12), in fact the expansion of invasive species is far from having reached their theoretical potential limit in the current climate and this will be further facilitated by climate change. Moreover the change in both lower and higher limits of laurel forest is an enormous opportunity to alien plant invaders. This might reveal to be the most serious threats of all considered so far. Furthermore, changes in water balance, increase in water use, and changes in fire susceptibility (along with many other factors) introduce serious doubts on the expansion model (Figueiredo & Sequeira 2016ab). In fact if it happens, it will consist of the expansion in altitude but a retreat in lower altitudes and, simultaneously, loss of higher altitude habitats and the loss of many endemic species. There are in fact many knowledge gaps particularly in the area of physiological ecology, providing enough uncertainty in these predictions (including the synergic contribution of several processes such as plant invasion, fire susceptibility, water use and ecosystem change that need to be urgently addressed).

► Rare and endemic plants

Data Deficient
Trend:Data Deficient

According to the IUCN Red List (2012) some of the plant species listed present in the site are Endangered or Near threatened. However, their population trend is largely unknown; such is in the case of Thamnobryum fernandesii or Culcita macrocarpa and many others.
Nevertheless, most of the plant species, even plants considered critically endangered, endangered or least concern, present a stable trend or even increasing populations (IUCN Red List, 2012).

► Rare and endemic vertebrates

Data Deficient
Trend:Data Deficient

The population trend of the endemic bat Pipistrellus maderensis that is classified as Endangered is in decline. However, there is limited data about other species.

► Rare and endemic invertebrates

Data Deficient
Trend:Data Deficient

Leiostyla gibba is classified as Critically Endangered (IUCN Red List (2012) and its population trend is unknown.
In general, all invertebrates groups require exhaustive studies and regular monitoring.

Summary of the Values

► Assessment of the current state and trend of World Heritage values

High Concern

Trend: Deteriorating

Although Laurisilva of Madeira has largely maintained its natural ecological and biological processes (in recent decades) , the increase in fire risk, the expansion of invasive species, the increase in water demand, and the increase in human usage (mainly tourism and infrastructure development) all pose serious threats. Several plant and vertebrate species seem to present stable population trends, but for most species there are no consistent data (due to lack of monitoring projects). There is an urgent need to develop specific surveys and scientific studies for invading species, threatened plants, bats and invertebrates. Recent fires lead some species almost to extinction (Taxus baccata, Sorbus maderensis and Juniperus cedrus) affecting mainly higher altitudes.

► Assessment of the current state and trend of other important biodiversity values

Data Deficient

Trend: Data Deficient

data deficient

Additional information

Benefits

Understanding Benefits

► **Carbon sequestration, Soil stabilisation, Water provision (importance for water quantity and quality)**

This forest has hydrophilic characteristics and plays a predominant role in the island´s hydrological balance. In great extent it is responsible for the collection of water from the mists and from vertical precipitation (SoOUV, 2010). This forest occupies 2/3 of Madeira island and it has a major contribution for soil stabilisation (avoiding landslides) and for water quality and quantity. Also plays an important role on climate change mitigation by providing significant carbon sequestration.

► **History and tradition**

Laurisilva of Madeira contains an important testimony of human use. The settlers of Madeira constructed water channels, known as levadas, which run through the forest following the contours of the landscape, and clinging to the cliffs and steep-sided valleys. Typically 80-150 cm wide and constructed of stone or more recently concrete, they carry water from the forest to hydropower stations and to the towns of the south, where they provide essential drinking water and irrigation supplies. Along the levadas there are paths typically 1-2m wide, which allow access to the otherwise almost impenetrable forest. None has been built for 70 years, but the present ones are carefully maintained (SoOUV, 2010).

► **Outdoor recreation and tourism**

The site is very important for nature tourism associated to levadas, birdwatching, sports practice (canyoning) and scientific tourism related to

fauna and flora endemism.

Summary of benefits

Beyond its paramount intrinsic conservation value, the Laurisilva of Madeira provides benefits not only to the inhabitants of the island of Madeira but also for global community. The site has a major importance for soil stabilisation and for water quality and quantity. It plays an important role on climate change mitigation by providing significant carbon sequestration. Tourism represents one of the most important assets of Madeira, as recognised by the main stakeholders.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	Atlas of Breeding Birds in Madeira Archipelago		Identification of bird distribution and estimation species abundance in Madeira archipelago. This data will be a very useful instrument for nature conservation and in socio economic activities such as nature tourism
2	BIOCLIMAC		Evaluation of the effects of climate changes on vegetal diversity of Macaronesian archipelagos (Canaries, Madeira and Azores). Development of an adequate sample model for seed collection aiming at the creation of a seeds bank that guarantees the genetic diversity. Increase of public attention for the need to conserve natural resources and effects of climate changes on them
3	PNM		Monitoring of population trend and implementation of measures that allows the equilibrium between Madeira Laurel Pigeon presence at Laurisilva boundaries and agricultural practice trying to minimize damages made on the crops
4	SPNM		Control and eradication of invasive alien plants aiming at recovery of natural ecosystems. This project also aims to raise awareness of managers, nature areas visitors and others stakeholders such as plant producers and sellers of the importance of invasive alien species control.
5	IFCN		Eradication of invasive species in boundary areas (Ulex and Cytisus)

№	Organization/ individuals	Project duration	Brief description of Active Projects
6	IFCN		"Conservation of Macaronesian Sparrowhawk and Laurissilva habitat in Madeira Island"
7	IFCN		Life Maciço Montanhoso
8	DRFCN		PROF-RAM (Plano Regional de Ordenamento Florestal da Região Autónoma da Madeira)
9	DRFCN		IFRAM 2 (Inventário Florestal da Região Autónoma da Madeira)

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Monitoring of ecosystem trends and changes	Gather information on ecosystem trends and changes, based on the installation of permanent plots on several distinct ecosystems included on the property.	
2	Monitoring of key species , including dominant trees and other important plants such as endangered species (Native and native/endemics)	Key dominant species of the property include lauraceae (and also Clethraceae). Their growths, health, recovery among other factors are largely unknown. Many native and native endemic species need be monitored in order to obtain more and better data for future management actions.	
3	Monitoring of bat populations	Madeiran bats need to be urgently studied and monitored, as they correspond to a largely unknown group of specie [(Plecotus austriacus (Fischer, 1829), Hypsugo savii (Bonaparte, 1837), Pipistrellus maderensis (Dobson, 1878), Nyctalus leisleri (Kuhl, 1817), and (Tadarida teniotis (Rafinesque, 1814)], some of them dependent on forest ecosystems, their population trends need to be accurately assessed in order to implement efficient management actions	

№	Site need title	Brief description of potential site needs	Support needed for following years
4	Evaluation of fire risk and fire risk changes due to the spread of invasive species	Management of risk situations, namely fire, are of paramount importance, in fact fire has not only recently affected several areas of laurissilva but in several occasions was close to affect dramatically core areas of the property (in 2016 for 3 days it was close to affect the Rabaçal area). Behaviour of the forest depends on composition, structure, humidity, wind etc. but also on the presence of exotic species such as Acacia, Cytisus and Ulex. Therefore analysing information on forest type, invaded areas, closeness of invaded areas etc., will result on a fundamental management asset, both for defining priority areas (for removal of invasive species) but also risk priority where surveillance and allocation of firefighting structures/means is most needed.	
5	on forest type, invaded areas, closeness of invaded areas etc., will result on a fundamental management asset, both for defining priority areas (for removal of invasive species) but also risk priority where surveillance and allocation of firefighting structures/means is most needed.	Although there are several maps of Madeiran forests, there is no map of vegetation. A vegetation model is available and it is straightforward to make the correspondence to the habitats described and listed in Habitats Directive, therefore obtaining a Vegetation Map/habitat cartography does not depend on the description of the vegetation (see Capelo et al. 2004) and could be compared with Natural Potential Vegetation Maps (already alvailable, see Mesquita et al., 2007).	
6	Invasive flora control	This is possibly the most important project, and also where most financial means should be applied, invasive flora represents the worst biological risk to the property. However, part of the project should be designed to prevent further invasions and it should therefore pinpoint the sensible frontiers (harbours, airport) and design more effective tools to control the entry of new species.	

№	Site need title	Brief description of potential site needs	Support needed for following years
7	Compensation for damage caused by Pigeon	This is a crucial project in order to turn local people toward conservation; damage on agriculture fields has been extensive in the last years, and illegal killing of pigeon was detected on many occasions. The use of forestry guards to preform control actions is not only complex (politically) but also costly and not effective.	

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