G2.3 Macaronesian laurophyllous woodland

Summary

This evergreen lauriphyllous forest with a very rich and luxuriant associated flora and fauna is confined to the humid to hyper-humid, frost-free, mist-bound cloud belt of the Macaronesian islands where deep soils are kept permanently moist by rain and fog-drip. The diverse canopy of laurel-leaved trees and shrubs, many of them ancient endemics to the islands, can be very tall, with some of the tree species suckering over and again to produce dense multi-stemmed individuals. In general, these forests have more climbing plants, ferns and epiphytic mosses than the Macaronesian heaths and the lush bryophyte cover is important in intercepting and retaining atmospheric moisture. The woodlands show variation according to the local climatic conditions across the archipelagoes and there is some striking local endemism on different islands. Competing land uses and natural hazards like fire and climate change are potential threats and conservation demands limits to urbanisation, wildfires and invasion of non-native plants.

Synthesis

There is historical evidence, from a time span dating back to the XVI century that the habitat's area has been much reduced. Historical descriptions of fire, cutting for timber and clearing land for agriculture are inequivocal for all the three archipelagos. Comparison with Natural Potential Vegetation Maps supports the idea of a large reduction. Thus, in spite of a recent and present favourable status (an area increase of about 40%), the strong historical reduction (criterion A3) leads to the category Vulnerable (VU). Besides, parts of the habitat have undergone a reduction in abiotic and biotic quality in the last 50 years due to cutting for timber and replacement by afforestations, but quantitative values are uncertain and not expected to lead to a Red List category.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A3	Vulnerable	A3

Sub-habitat types that may require further examination

Sub-types with a different species composition may be distinguished for each archipelago (azorean, madeirean, canarian).

Habitat Type

Code and name

G2.3 Macaronesian laurophyllous woodland

Laurisilva at La Gomera, Canary Islands, with *Woodwardia radicans* understorey (Photo: John Janssen).

Forest of *Ocotea foetens* / *Laurus novocanariensis* at Madeira Island (Photo: Sandra Mesquita).

Habitat description

Evergreen lauriphyllous forests with a very rich and luxuriant associated flora and fauna typical of the humid to hyper-humid, frost-free, mist-bound cloud belt of the Macaronesian islands. So-called 'Atlantic rain forest', this habitat forms the most complex and remarkable relict of the humid sub-tropical vegetation of the Miocene-Pliocene period in southern Europe. Occurring at 500-1500m, it is typical of slopes with deep soils kept permanently moist by rain and fog-drip. Humidity tends to decline from north to south among these archipelagos but, particularly on Madeira and the more westerly Canary Islands, more dramatic topography has a strong influence on the local climatic conditions.

In contrast to the G2.7 Macaronesian heathy woodlands which are dominated by shrubby ericaceous plants, the canopy here is composed of laurel-leaved trees and shrubs, many of them ancient endemics to the islands. The canopy of these highly productive woodlands can reach over 30m with some of the tree species suckering over and again to produce dense multi-stemmed individuals. There can be up to 20 different tree species in a few hectares, prominent among them *Laurus azorica, L. novocanariensis, Myrica faya, Ocotea foetens, Persea indica, Apollonias barbujana, Clethra arborea, Erica arborea*, *E. azorica, Ilex canariensis, I. perado ssp. azorica, I. perado ssp. perado, Isoplexis canariensis, Ixanthus viscosus, Picconia azorica* and *P. excelsa.* In general, these laurel forests also have more climbing plants, ferns and epiphytic mosses than the Macaronesian heaths. The lush bryophyte cover, including some liverworts, is important in intercepting and retaining atmospheric moisture.

The woodlands show variation according to the local climatic conditions, sub-humid forms favouring southern slopes within areas of 500mm annual precipitation and little influence of the cloud-belt (eg. the Visneo-Apollonion and Canarian Ixantho-Laurion); humid types with precipitation of up to 1200mm, sunshine and temperature lessened by fogs (eg. Azorean Dryopterido-Laurion); and the hyper-humid with precipitation over 1500mm and permanent fogs, conditions typical of mountains of Madeira and the Azores (eg. the Sibthorpio-Clethrion). Local endemism also means that particular islands can have a highly distinctive character and, in some places, degradation and invasion of introduced taxa like *Pittosporum undulatum* affects the floristic composition (as in the *Myrico-Pittosporion* of coastal slopes on the Azores).

Indicators of quality:

Particularly at lower altitudes and on less difficult terrain, areas of intact laurel forests have been drastically reduced by forest exploitation in clear-cutting for charcoal, tool-making and compost production, by planting of replacement forests of commercial timber trees; or by dairy-cattle grazing which hinders regeneration and causes eutrophication. Road construction through forests also allows the spread of invading species. Signs of high quality in remaining stands are:

- the continuance of structural and floristic integrity of the forest vegetation without secondary

regeneration after interventions or the dense growth that develops with abandonment of operations
- survival of larger stands of forest without fragmentation and isolation
- absence of damage from fires, particularly threatening in the sub-humid Canarian forests, with death of older hollow trees, consumption of deadwood and litter and development of combustible pioneer vegetation afterwards
- absence of introduced invaders such as *Pittosporum undulatum, Hedychium gardnerianum, Clethra arborea* (an endemic but cultivated as an ornamental), particularly threatening on the Azores and Madeira.

Characteristic species:

Tree canopy: *Laurus azorica, L. novocanariensis, Myrica faya, Ocotea foetens, Persea indica, Apollonias barbujana, Clethra arborea, Erica arborea*, *E. azorica, Ilex canariensis, I. perado ssp. azorica, I. perado ssp. perado, Isoplexis canariensis, Ixanthus viscosus, Picconia azorica* and *P. excelsa, Viburnum tinus, Frangula azorica, Viburnum tinus ssp. subcordatum, Juniperus brevifolia, Prunus lusitanica, Sambucus lanceolata, S. palmensis, Ruscus streptophyllus, Phillis nobla, Ocotea foerens, Rubia peregrina, Tamus edulis, Rubus ulmifolius;* Field layer: *Asplenium onopteris, Dryopteris oligodonta, Pteridium aquilinum, Asparagus fallax, Galium scabrum. Diplazium caudatum, Woodwardia radicans, Brachypodium syklvaticun, Sibthorpia peregrine Eupatorium adenophorum, Ixanthus viscosus, Carex canariensis, C. peregrina.*

Some endemic bird species live almost entirely in the laurel forests: Madeiran laureal pigeon *Columba trocaz*, Canarian dark-tailed laurel pigeon *C. bollii* and white-tailed laurel pigeon *C. junoniae* and the Azores bullfinch *Pyrrhula murina.*

Classification

This habitat may be equivalent to, or broader than, or narrower than the habitats or ecosystems in the following typologies.

EUNIS:

G2.3 Macaronesian [Laurus] woodland

EuroVegChecklist alliances:

Culcito macrocarpae-Juniperion brevifoliae Lüpnitz 1975

Dryopterido azoricae-Laurion azoricae Rivas-Mart. et al. 2002

Myrico fayae-Pittosporion undulati Lüpnitz 1976

Ixantho viscosae-Laurion azoricae Oberd. ex Santos in Rivas-Mart. et al. 1977

Sibthorpio peregrinae-Clethrion arboreae Capelo et al. 2000

Visneo mocanerae-Apollonion barbujanae Rivas-Mart. in Capelo et al. 2000

Annex 1:

9360 Macaronesian laurel forests (Laurus, Ocotea)

Emerald:

G2. Broadleaved evergreen woodland

MAES:

Woodland and forest

IUCN:

1.4 Temperate Forest

EFT:

9.4 Macaronesian laurisilva

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?
Yes

Regions
Macaronesian

Justification
The habitat stands for relict forest vegetation with strong affinities with Tertiary subtropical vegetation ('geoflora'). Contrary to continental european forest vegetation, it was not influenced by glaciations during the Pleistocene and thus lacks both deciduous elements (artho-tertiary flora) and mediterranean sclerophyllous trees (paleomediterranean elements). It is found in the Azores, Madeira and Canary Islands, with an empoverished very small spot in the Morocco atlantic coast. It has an absolute compositional and structural originality and very high degree of endemism. The Azorean variant is quite distinct from that of Madeira and Canary Islands.

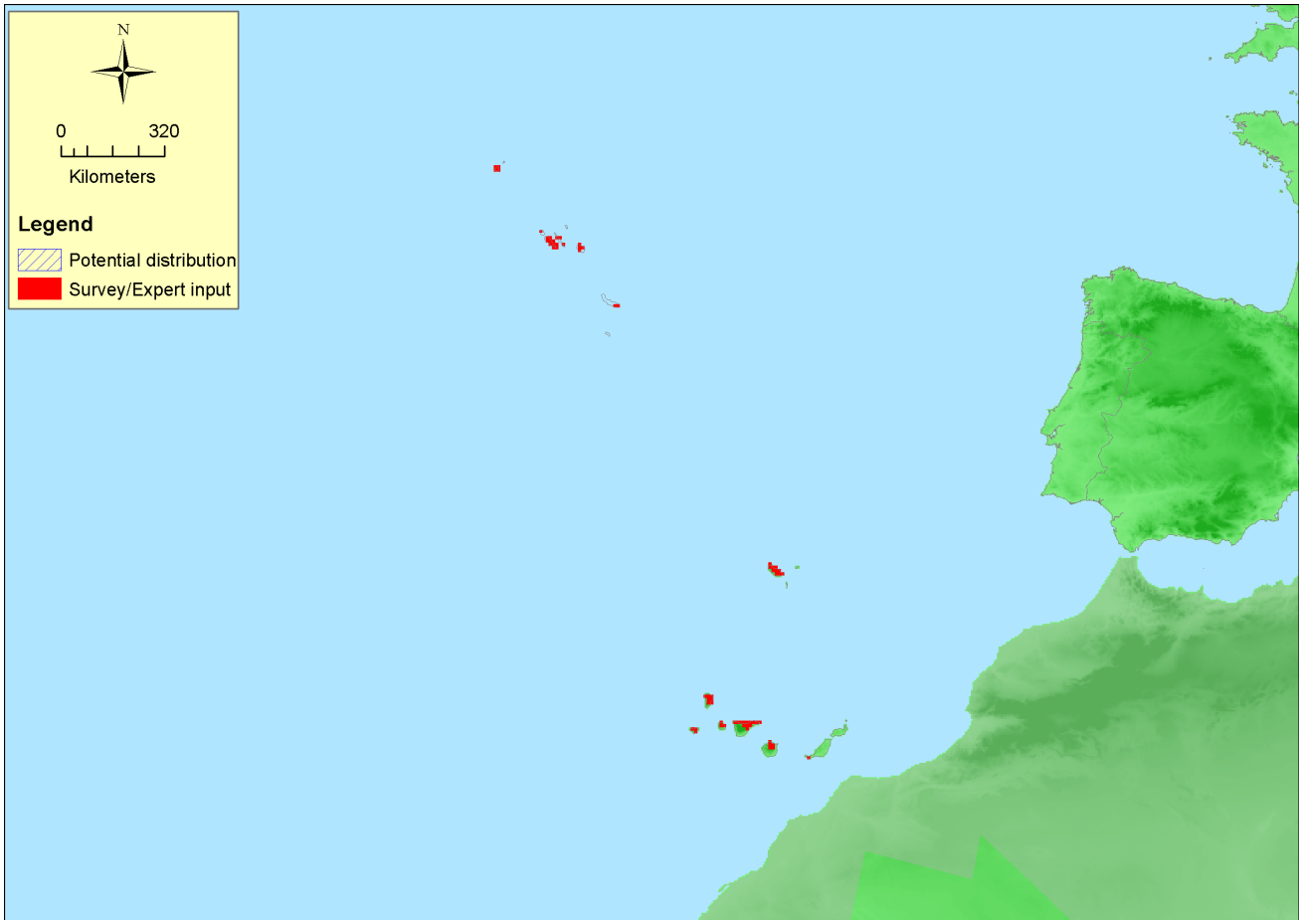
Geographic occurrence and trends

EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Portugal	Madeira: Present Portugal Azores: Present	267 Km^2	Increasing	Unknown
Spain	Canary Islands: Present	60 Km^2	Increasing	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	581650 Km^2	66	327 Km^2	
EU 28+	581650 Km^2	66	327 Km^2	

Distribution map



The map is complete. Data sources: Art17.

How much of the current distribution of the habitat type lies within the EU 28?

More than 95% lies within the EU28. The few moroccan spots are small and species-poor.

Trends in quantity

Altough historically much reduced, from logging for timber, firewood and conversion to agriculture: - territorial estimates for the Canary Islands amount to ca. 80% of area reduction since 1500 CE, for instance - the recent tendency , i.e. estimates within the scope of the last 50 years show a clear tendecy of recover. This is due to abandonment of agricultural land and recovery of secondary forest. Territorial estimates for the Canary Islands amount to 50.000 ha of abandoned agricultural land, as changes in political and macroeconomic settings As a result, the present and future tendency is of clear increase of laurel forests, as a result of the PAC and effective nature conservation policies. If these genaral conditions are kept, increase in area is to be expected all the same. As for Madeira and the Azores, there are no objective data to account for estimates but the situation is putatively analogous to that of the Canaries.

- Average current trend in quantity (extent)
  EU 28: Increasing
  EU 28+: Increasing
- Does the habitat type have a small natural range following regression?
  No
  Justification
  In the last 50 years scope, there is evidence of incresing of the habitat´s area, mustly due to change in agricultural common policies and macroeconomic ameloration impling less preassure on forest for fuel and timber.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

Justification

Although restricted to the Azores, Madeira and the Canaries due to paleobiogeographical reasons, it´s range is large enough not to be taken as 'small' (EOO>50000 Km2).

Trends in quality

Current conditions of most laurel forests are of good preservation in terms of presence of most characteristic species and structure. Nevertheless, due to some afforestations in the recent past (aprox. 50 years) with exotic species (Eucalyptus and chestnut trees) and areas that are nowadays the result of secondary regenerations an amout of 30% with reduced ecological quality has been estimated (severity unknown). These factors that are degradative of quality have, in the present, almost ceased. Thus, near future trends are of stable or even incresing of quality.

- Average current trend in quality
  EU 28: Increasing
  EU 28+: -

Pressures and threats

Although expansion of exotic forest (eucaliptus, non-native conifers and chestnut) is not to be expected, their persistence in areas of potential laurel forest is a threat because it prevents natural regeneration of native laurel forest. Conversion of such exotic forests to regeneration of laurel is not many times straightforward. Analogous issues can be assumed for agriculture (banana, vineyards, greenhouse crops).Preassure issuing from urban or touristic expansion is still to be taken on account as social and institutional conflicts do not favor nature conservation everytime. Climate change may cause bioclimatic optima to change and such vegetation-belt altitude changes that might cause ecological disruption of laurel forest vegetation along with the loss of species or promotion of aliens. Although a rare event, wildfire during drought or heat-spells may be a serious threat to laurel forests.

List of pressures and threats

Agriculture

Cultivation

Sylviculture, forestry

Forest and Plantation management & use
- Forest replanting
- Forest replanting (non native trees)

Urbanisation, residential and commercial development

Urbanised areas, human habitation
- Discontinuous urbanisation
- Dispersed habitation
- Agricultural structures, buildings in the landscape

Invasive, other problematic species and genes

Introduction or spread of non-indigenous species

Geological events, natural catastrophes

Fire (natural)

Climate change

Changes in abiotic conditions
Temperature changes (e.g. rise of temperature & extremes)
Droughts and less precipitations
Habitat shifting and alteration
Desynchronisation of processes
Decline or extinction of species
Migration of species (natural newcomers)

Conservation and management

Keeping local, regional, national and UE conservation status aswell as keeping the actual protected areas and management practices will guarantee habitat persistence.

In addition, elimination of alien plants that are frequent in secondary laurel forest should be sought.

Protection against wildfires and urbanization preassures should be the most strict as possible.

List of conservation and management needs

No measures

Measures needed, but not implemented

Measures related to forests and wooded habitats

Restoring/Improving forest habitats

Measures related to spatial planning

Establish protected areas/sites
Establishing wilderness areas/allowing succession

Conservation status

Annex I:

9360: MAC U1

When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

As a mature forest, depending on the extent of damage, it will count on ecological sucession to establish a comparable state in terms of structure, composition and function (mature closed forest). It is expected that, if the soil was not severely eroded and disturbance regimes causing disruption will cease, that forest species will be able to establish and be ecologically dominant again in a time span of several decades to a century. Silvucultural practices of elimination of dominated individual trees might accelerate tree sucession towards mature laurel forests. Otherwise, sucession through self-thinning will take longer although the risk of deriving to an somewhat artificial habitat (the former option) is much reduced.

Effort required

50+ years	200+ years
Through intervention	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	+41 %	unknown %	unknown %	>50% %
EU 28+	+41 %	unknown %	unknown %	>50% %

For Madeira and Azores, maps of national forest inventory from 1974 allowed an estimate of area of laurel forest increase of 50%. For the Canary Islands an expert estimate amounts to 10% increase since 1960. The average value of 40% is thus assumed to the set of three archipelagos. Simple extrapolation for the next 50 years period would yield and increase around 40% or more, but such a simple reasoning is arbitrary and uncertain and the values for A2a and A2b are considered unknown. Historical reduction (A3 criterion) is estimated to be between 50 to 70% of the original area (1750 C.E.) based on literary or intitutional descriptions and comparison of actual area to Natural Potential Vegetation Maps.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50000 Km^2	No	No	No	66	No	No	No	No
EU 28+	>50000 Km^2	No	No	No	66	No	No	No	No

Especially the AOO values is close to the threshold for B2, but as there are no continuing declines or threats all criteria under B are assessed Least Concern.

Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	30 %	35 %	unknown %	unknown %	unknown %	unknown %
EU 28+	30 %	35 %	unknown %	unknown %	unknown %	unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%
EU 28+	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%

Territorial estimates for the Canary Islands yield a reduction in quality on 30% of the area since 1960, with unknown severity of degradation, but mostly due to cutting for firewood and habitat replacement with conifer/exotic hardwood aforestattion. Based on the main degradation effects cited (cutting and exotic afforestation), severity is estimated to be slight tor moderate. No such estimates exist for the Azores and Madeira. The values do not lead to any Red List status for criterion C/D1.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	unknown
EU 28+	unknown

There is no quantitative analysis available that estimates the probability of collapse of this habitat type.

Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	LC	DD	DD	VU	LC	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	VU	LC	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A3	Vulnerable	A3

Confidence in the assessment
Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert knowledge)

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Date of assessment
07/10/2015

Date of review
20/05/2016

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