



# Marteloscope

## Monte de Valsain

Field guide



GOBIERNO  
DE ESPAÑA

VICEPRESIDENCIA  
TERCERA DEL GOBIERNO

MINISTERIO  
PARA LA TRANSICIÓN ECOLÓGICA  
Y EL RETO DEMOGRÁFICO

ORGANISMO  
AUTÓNOMO  
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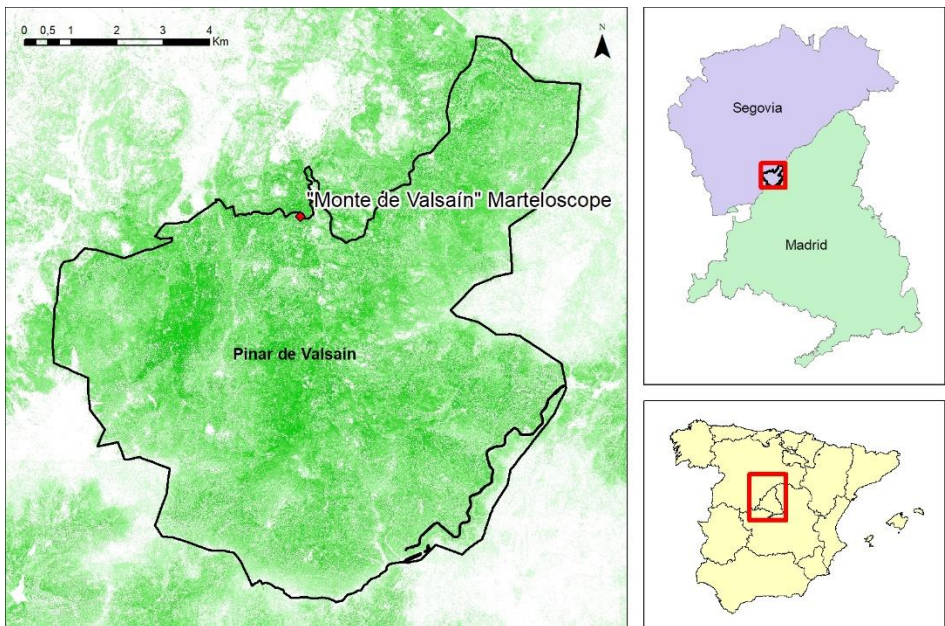
# Pinar de Valsaín forest

The forest of Pinar de Valsaín is located in the municipality of Real Sitio de San Ildefonso (Segovia, Castilla y León), close to two important urban areas, Segovia and Madrid.

Valsaín forests are recognized for their natural and historical importance. In 1579, they became the first natural area with legal protection in Spain, with the prohibition of hunting and fishing. From 1761 the area was owned by the Crown until during the Second Republic (1931-1939) it became part of the State Heritage. In 1982 the ownership of the various properties that comprise the forests of Valsaín was transferred to the state forestry administration, then known as Instituto Nacional para la Conservación de la Naturaleza (ICONA). Currently, these forests are managed by the Organismo Autónomo Parques Nacionales (OAPN) through the Centro Montes y Aserradero de Valsaín, which is responsible for harmonizing the conservation of this natural area and its species with forestry, livestock and recreational activities.

Located in Sierra de Guadarrama, there is a considerable altitudinal variation: from the summits of more than 2000 m of altitude to the valley bottoms located just over 1000 m in just a few kilometres. Accordingly, more than half of the forest surface has a high slope (more than 25%). Rainfall varies from 1350 mm in the high areas to 460 mm in the low areas. As for the average annual temperature, it ranges between 6.5 °C in the high areas and 12 °C in the low areas.

*Location of Monte de Valsaín marteloscope. Height of the vegetation in green, following a gradient from lighter to darker as this height increases. Blank areas lack vegetation (Source: IGN).*



**7581 ha**  
Total forest area

**7.5 m<sup>3</sup>/ha**  
Annual increment

**414 m<sup>3</sup>/ha**  
Actual average stock

**7204 ha**  
Tree covered area

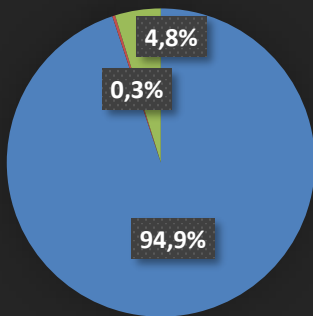
**0.7 m<sup>3</sup>/tree**  
Average tree volume

**4.4 m<sup>3</sup>/ha**  
Annual allowable cut

**616 trees/ha**  
Tree density

**123.6 €/ha**  
Annual income from wood

**99.8 %** conifers  
**0.2 %** broadleaves



■ *Pinus sylvestris*

■ *Quercus pyrenaica*

■ Barren areas (shrubland, grassland) and unproductive areas (rocks, roads, etc.)

**258.9 t/ha**  
Biomass  
(above and below ground)

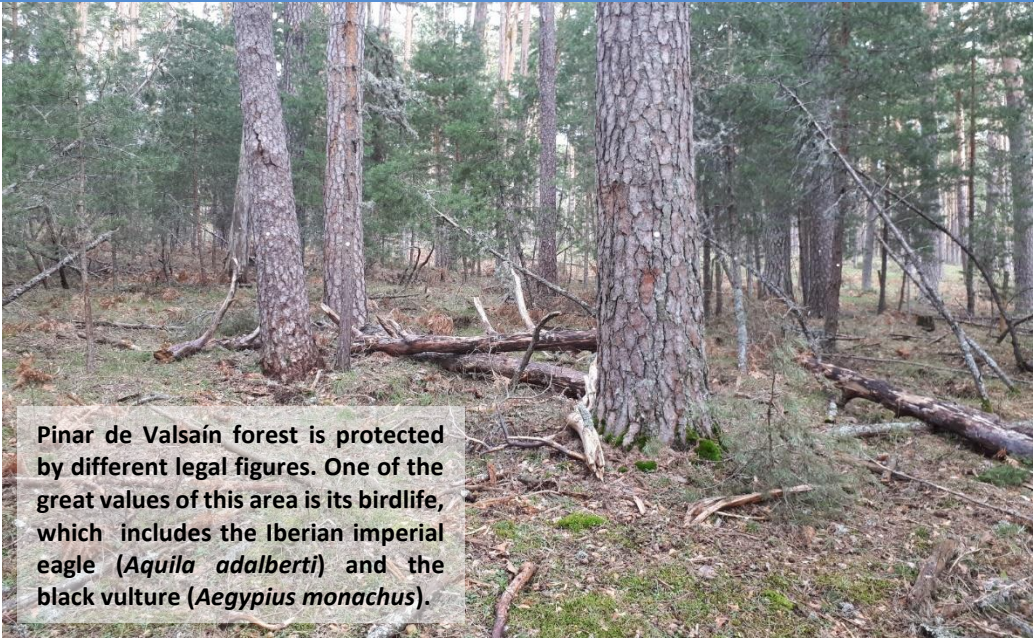
**483 t/ha**  
CO<sub>2</sub>

**38.2 m/ha**  
Roads and trails density

**4.9 t/ha·year**  
Annual biomass increment

**9.1 t/ha·year**  
Annual CO<sub>2</sub>  
increment

# Forest management and biodiversity



**Pinar de Valsain forest is protected by different legal figures. One of the great values of this area is its birdlife, which includes the Iberian imperial eagle (*Aquila adalberti*) and the black vulture (*Aegypius monachus*).**

The pine forests of *Pinus sylvestris* are predominant in the area. There are also oak groves of *Quercus pyrenaica* below 1400 m, and grasslands and shrub formations, predominant above 2000 m.

This pine forest is mainly used for wood production. Nevertheless, this activity is affected by different restrictions. For example, cutting is not allowed within a radius of 100 meters around the nests of black vulture and imperial eagle, rising to 500 meters during the breeding season. Also, trees with diameters bigger than 80 cm or heights bigger than 35 m cannot be cut, and neither can those with climbing plants or threatened species nests, even if they are not currently being used.

The forest management plan divides its area into 12 districts. One of these (Protection district) is at the highest altitudes, where the soil is less developed. The intention is to have a naturalized mature pine forest in this area. Therefore, there is no wood extraction, making it a forest reserve. As a result of this management, the protection district currently has densities of standing deadwood greater than 2 trees/ha, higher than the rest of the forest.

10.2 %

of the forest area are forest reserves

867 taxons of autochthonous vascular flora

130 bird species

22 bat species

54 endemic invertebrate species

5.54 m<sup>3</sup>/ha

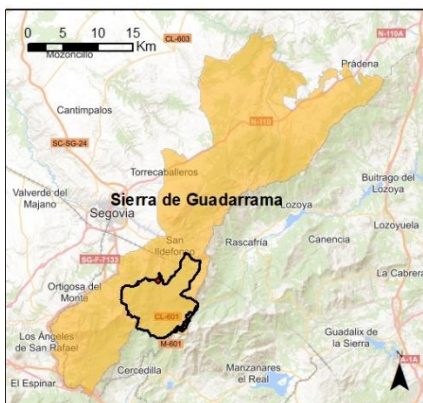
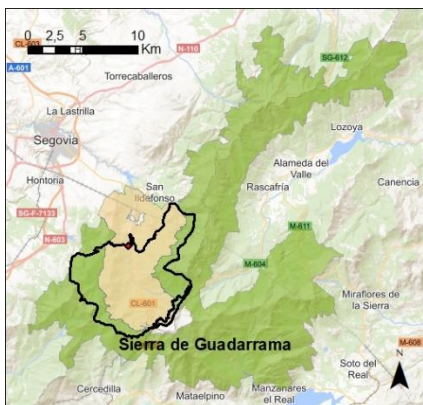
deadwood

1.53 %

share of deadwood out of the total above-ground biomass

0.7-1.3 trees/ha

standing deadwood



♦ "Monte de Valsain" Marteloscope

□ "Pinar de Valsain" forest

■ National Park (NP)

■ Special Protection Area NP

■ Biosphere Reserve

■ Natura 2000 Network

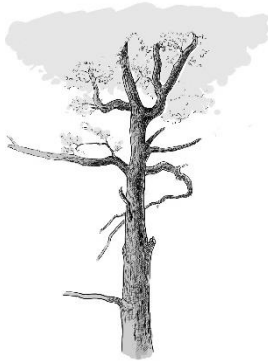
Protected areas in Pinar de Valsain forest.

# Habitat structures

Large quantities of deadwood and a high density of old microhabitat-bearing trees are characteristic elements of natural forests, especially in the old-growth phases. These phases are often absent or rare in managed forests, even in forests under close-to-nature management. Also in selective harvests and thinnings, 'defective' trees referring to these old-growth phases (hollow, dead and languishing trees) are often removed. Yet, an important share of forest biodiversity is strictly or primarily dependent on these elements for their survival, especially 'saproxyllic' species, which are species depending on deadwood.

Most species dependent on old-growth elements and phases have become threatened. Conservation of biodiversity in commercial forest stands is mainly a question of conservation of adequate amounts of deadwood and retention of such microhabitat structures.

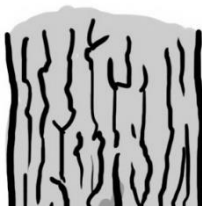
**Dead  
branches  
and  
limbs /  
crown  
deadwood  
(DE11)**



**Epiphytes  
(mistletoe)  
(EP35)**

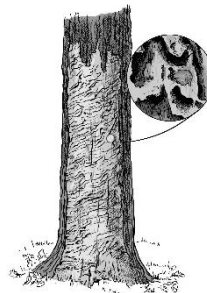


**Coarse bark  
(BA21)**



**Insect galleries  
and bore holes**

CV51: Gallery with  
single small bore  
holes



*Most common habitat structures in the marteloscope.*

## ...and biodiversity



*Aegypius monachus*



*Acanthocinus aedilis*



*Graellsia isabelae*



*Narcissus pseudonarcissus*



*Nyctalus lasiopterus*



*Alytes obstetricans*

Pictures by:

María Soledad  
Redondo Rodríguez

# Site conditions

Coordinates (X, Y):	413102, 4523264 (ETRS 89 UTM Zone 30N).
Type of forest:	Montane/subalpine scots pine forest.
Soil:	Argiluvic.
Geology:	Granite with veins of porphyry, diorites and quartz.
Altitude:	1230 m.a.s.l.
Mean annual temperature:	10.6 °C.
Annual precipitation:	690 mm.
Summer precipitation (June 1 <sup>st</sup> – August 31 <sup>st</sup> ):	86.9 mm.
Mean period of drought:	2 months (July and August)

The scots pine forest in Valsaín altitudinal range goes from 1200 m to 2000 m. The vegetation of this marteloscope, with an average altitude of 1230 m, is representative of the lower altitudes of the pine forest.

The understory is composed mainly of *Genista florida*, *Juniperus communis*, *Cytisus oromediterraneus*, *Rosa sp.* and *Rubus sp.*, in the clearings of the pine forest. *Quercus pyrenaica* and *Ilex aquifolium* are also present, especially in more shady, moist and cool areas.

Other common species in these lower parts are *Lonicera peryclimenum*, *L. xylosteum*, *Sorbus aucuparia*, *Crataegus monogyna*, *Prunus spinosa*, *Erica arborea*, *Corylus avellana* and *Prunus avium*.





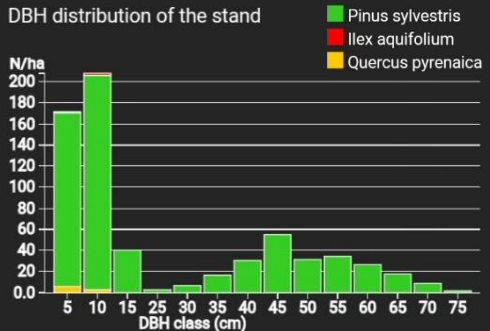
# Stand characteristics

The **Monte de Valsaín** marteloscope is located on a fenced plot on the outskirts of Pinar de Valsaín forest known as "Torres del INIA". Subject to other studies, this stand has greater tree cover than its surroundings.

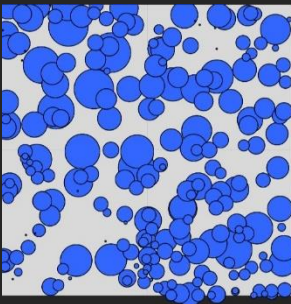
## Stand data

N [stems/ha]	645
BA [m <sup>2</sup> /ha]	53
Volume [m <sup>3</sup> /ha]	691
Tree microhabitats [units]	512
Habitat value [points]	8,120
Economic value [€]	24,490
Standing deadwood [m <sup>3</sup> /ha]	30.4
Lying deadwood [m <sup>3</sup> /ha]	26.9

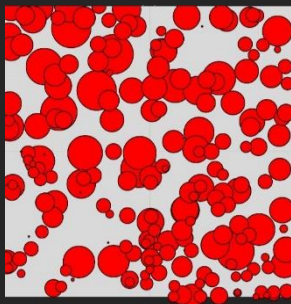
DBH distribution of the stand



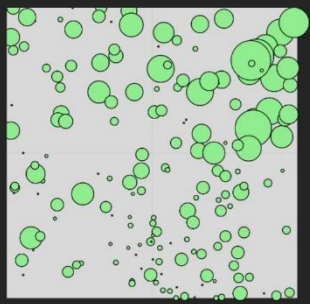
Volume [m<sup>3</sup>]



Economic value [€]



Habitat value [points]



The **economic value** (in €) is estimated for each tree based on volume, stem quality and corresponding local timber price lists.

The **habitat value** (in points) is assessed for each tree based on tree microhabitats, taking into account the rarity of each habitat and the duration for it to develop.

The evaluation of the habitat value is based on a comprehensive catalogue of tree microhabitats. It comprises 23 saproxylic and epixylic features such as cavities, large dead branches, cracks and loose bark, epiphytes, sap runs, or trunk rot characteristics. Tree microhabitats are of prime importance for specialized and often endangered forest species of flora and fauna.

# Ecological value assessment

Each tree-related microhabitat represents a habitat structure. There are three variables related to each of them, given values from 1 (minimum significance for that given variable) to 5 (maximum relevance).

These three variables are:

**Score:** Importance of habitat structure as a refuge for biodiversity.

**Rarity:** Infrequency or scarcity.

**Development:** Time needed for its growth.



*Example of EP12 (perennial polypores fruiting bodies with diameter bigger than 10 cm) found in the marteloscope.*

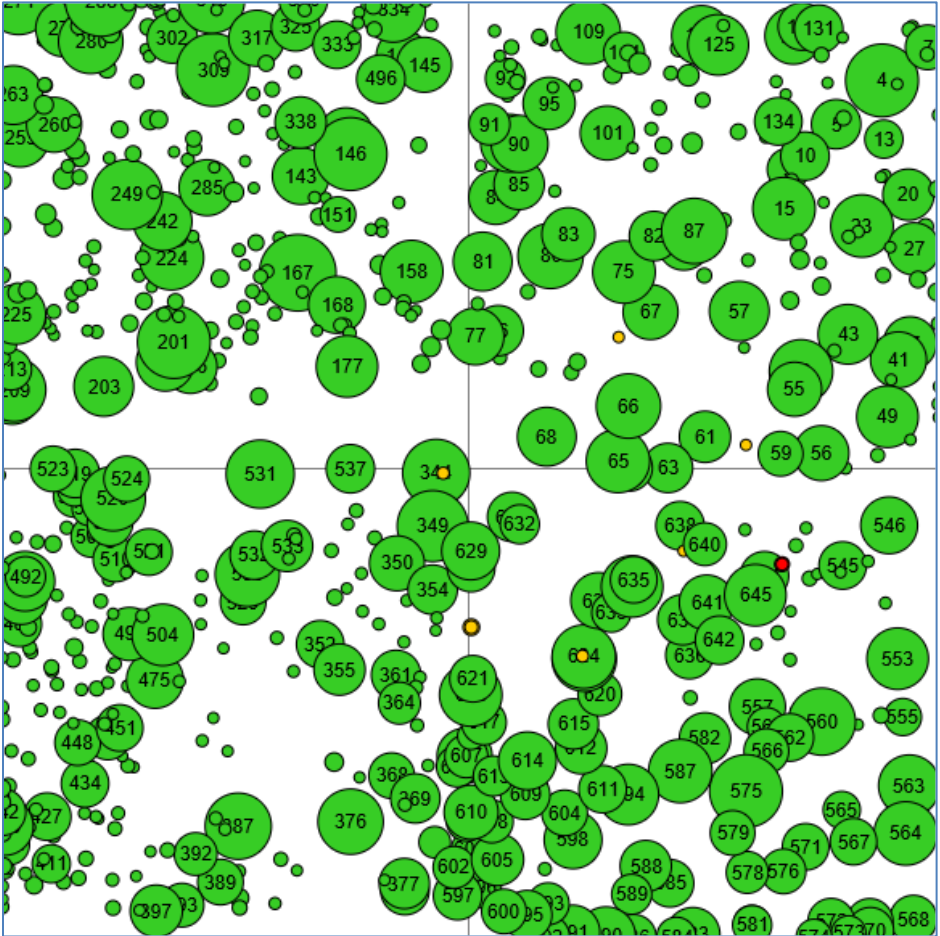
The ecological value of each habitat structure is therefore calculated by **adding the rarity and development values, and multiplying that sum by the score value.**

The ecological value of a tree will therefore be the addition of the values of each of its habitat structures. Finally, the total ecological value of the marteloscope, would be either the addition of the values of all the trees, or the addition of the value of all the structures (there can be several per tree).

*Table used for the calculation of the ecological value. Due to space limitations, only the 10 highest values are displayed. For more details about microhabitats see Kraus et al. (2016).*

	Habitat structure code	Score	Rarity	Development	Habitat structure value	Nº of trees with this structure	Ecological value
Saproxylc microhabitats	CV51	1	3	1	4	54	216
	IN21	2	4	3	14	17	238
	IN31	2	5	5	20	12	240
	BA21	1	3	3	6	54	324
	DE11	1	3	4	7	89	623
	DE12	2	3	4	14	44	616
Epixylic microhabitats	EP12	4	5	4	36	51	1836
	EP35	3	5	4	27	68	1836
	NE21	3	5	3	24	10	240
	OT11	4	5	3	32	11	352

# Marteloscope tree map



The size of these circles is a relative representation of the diameters of the different trees. In no case is it their actual diameter.

- *Pinus sylvestris*
- *Ilex aquifolium*
- *Quercus pyrenaica*



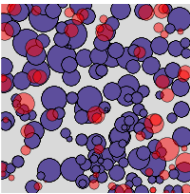
# Example of interventions

A comparison of two interventions is shown as a result of the first tree selection simulation *in situ* exercise in this marteloscope, carried out on May 12th 2022. Both of them are very delayed preparatory cuttings, with the site showing advanced regeneration.

The proposal in both scenarios is to extract 20-25% of basal area and volume following these guidelines:

- Minimize damage to existing regeneration.
- Minimize habitat value extraction.
- Optimize economic revenue.

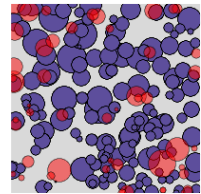
Economic value  
[€]



**Example 1**

5847 € obtained

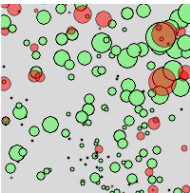
Economic value  
[€]



**Example 2**

5097 € obtained

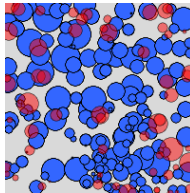
Habitat value  
[points]



6402

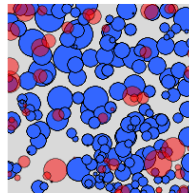
remains

Volume  
[m<sup>3</sup>]



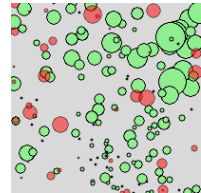
Removal  
153,9 m<sup>3</sup>

Volume  
[m<sup>3</sup>]



Removal  
134,3 m<sup>3</sup>

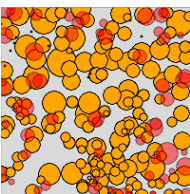
Habitat value  
[points]



6655

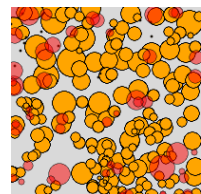
remains

Basal area  
[m<sup>2</sup>]



41,5 m<sup>2</sup>  
remains

Basal area  
[m<sup>2</sup>]



43,0 m<sup>2</sup>  
remains

# References

Photographs: María Soledad Redondo Rodríguez.

The different graphs, tables, screenshots, and other exercise results were created using the 'I+' software:

1) [iplus.efi.int](http://iplus.efi.int)

2) Schuck, A., Kraus, D., Krumm, F., Held, A., Schmitt, H., 2015. Integrate+ martelosscopes – Calibrating silvicultural decision making. Integrate+ Technical Paper No. 1. 12 p.

Cabrera, M. y Donés, J., 2021. Proyecto de 3ª Revisión de la Ordenación del monte nº 1 “Matas de Valsain” y 8ª Revisión del monte nº 2 “Pinar de Valsain” del Catálogo de los de Utilidad Pública de la Provincia de Segovia, Ministerio para la Transición Ecológica y el Reto Demográfico, Organismo Autónomo Parques Nacionales, Centro de Montes Valsain. 725 p. Retrieved September 7, 2021, from <https://www.miteco.gob.es/es/parques-nacionales-oapn/centros-fincas/valsain/ordenaciones.aspx>

Garcia, E., (2015): Observatorio de precios de productos forestales, RedFor, Confederación de organizaciones de selvicultores de España. [https://selvicultor.net/redfor/wp-content/uploads/Observatorio-de-precios-Completo\\_Sep-2015\\_Final.pdf](https://selvicultor.net/redfor/wp-content/uploads/Observatorio-de-precios-Completo_Sep-2015_Final.pdf)

IGN. Modelo Digital de Superficies normalizado de Vegetación - Primera Cobertura (2,5 metros). Downloaded April 4, 2022, from <http://centrodedescargas.cnig.es/CentroDescargas/catalogo.do?Serie=LIDAR>

Kraus, D., Büttler, R., Krumm, F., Lachat, T., Larrieu, L., Mergner, U., Paillet, Y., Rydkvist, T., Schuck, A., and Winter, S., 2016. Catalogue of tree microhabitats – Reference field list. Integrate+ Technical Paper. 16p. Retrieved September 7, 2021, from <http://www.integrateplus.org/media-center/project-documents.html>

Montes y Aserradero de Valsain. Retrieved September 10, 2021, from <https://www.miteco.gob.es/es/parques-nacionales-oapn/centros-fincas/valsain/default.aspx>

The Integrate Network is an alliance of representatives of different European countries that promotes the integration of nature conservation into sustainable forest management at the policy, practice and research levels. Forest management challenges related to nature conservation are rather similar across Europe. The Integrate Network promotes the exchange of successful management practices and experiences amongst its Members. The European Forest Institute (EFI) accompanies the process in its role as facilitator and scientific advisor.



Royo Serrano, L., Donés Pastor, J., García Gámez, J., Ramírez-López, M., García-Lanchares, C., Martínez Ruiz, A., Dregorio Aguilar, A., 2022. The Monte de Valsaín marteloscope field guide. Integrate Network Technical Paper. 14 p.

MITECO, 2022

[www.integratenetwork.org](http://www.integratenetwork.org)



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