

Appendix A1. Hazard assessment in Portugal and Galicia¹

Portugal						
Hazards	Type and source of information for impacted volume or surface per year	P 1 _H (percentage)	Type of damage	Type and source of information for hazard severity	P 2 _H (percentage)	Weight (W _H) ² Relative importance
Storm	There was two storm events in 30 years (IPMA 2016). In the last (2000-2001), the proportion of affected stands was 11% in the Littoral North of Portugal, and the proportion of dead trees was 10% in the affected stands (Fonseca 2004)	0.0007	mortality	Loss on wood prices (data from last storm, source CRPF Aquitaine) using data from Aquitaine	0.8650	0.0160
Fire	21.416 ha burnt in average per year (2001– 2012) in around 885016 ha of maritime pine forests (ICNF 2013a; ICNF 2013b)	0.0240	mortality	Complete loss for trees < 15 years (51% of all stands, data from NFI 2013); 15-25 years: wood will be used in biomass/woodboard plants/pallets (70% depreciation); for trees >25 years there is - 20% in average of loss in timber prices (Centro Pinus, personal communication)	0.7580	0.4802
Torrential rain	22.8% of the maritime pine forests are occasionally affected by torrential rain (Centre and North Littoral); 1 or more days with rainfall > 50 mm occurred in 9 years on 30 years (IPMA 2016); without specific data we assume that there is in average 11% of affected stands and 10 % tree mortality as observed on storm events (Fonseca 2004)	0.0008	mortality	complete loss for trees < 15 years (these are 51% of all stands, data source from NFI 2013); 15-25 years: wood will be used in biomass/woodboard plants/pallets (70% depreciation): for trees >25 years, there is 20% loss in timber prices in average, (Centro Pinus, personal communication)	0.7580	0.0160
Defoliator	(ICP Forests Data 1990-1999), defoliation classes moderate and severe (1990-1999)	0.0893	mortality, growth loss	Financial analysis (Gatto <i>et al.</i> 2009): difference in revenues =17.3%	0.1730	0.4078
Bark beetles	(ICP Forests Data 1990-1999) data of tree mortality, empirically we consider that ca. 75% of tree mortality is due to bark beetles	0.0099	mortality	In managed forests, there is no depreciation since trees are cut soon after death and before wood depreciation or tree decay. In the 18.2% of unmanaged forest, the loss is total (calculations performed from EFN (2015) and Baptista and Santos (2005))	0.1800	0.0470
Pitch canker	So far the disease was only detected in nurseries in Portugal. Without any other information, we data from Galicia which estimate that 0.25% of maritime pine area was affected by eradication measures (2008-2015)	0.0025	mortality	Felling of all trees affected. Loss of 50% in price (data from Galicia)	0.500	0.0330

¹The defoliator is the pine processionary moth *Thaumetopoea pityocampa*, the root rot fungus is *Heterobasidion annosum*, *Fusarium circinatum* is responsible for the pitch canker. In this table, the mention “bark beetles” refers to the four main species, e.g. *Ips sexdentatus*, *Orthotomicus erosus*, *Tomicus piniperda* and *Tomicus destruens*.

Galicia						
Hazards	Type and source of information for impacted volume or surface per year	P 1 _H (percentage)	Type of damage	Type and source of information for hazard severity	P 2 _H (percentage)	Weight (W _H) ² Relative importance
Storm	1% (Timber harvests derived from windstorms, Xunta de Galicia: period 1999-2015)	0.0100	mortality	Huge loss on wood prices (data from last storm, source CRPF Aquitaine) ; using data from Aquitaine	0.865	0.4714
Fire	1.3%(Galician Government Forest Fire Statistics: period 1995-2015)	0.0150	mortality	Complete loss for unitary volumes below 0.12 m ³ /tree. Average loss of 30% in timber prices for older stands (above 15 years in average). Data from timber auctions Galician Forest Administration, period 1995-2015	0.5625	0.4598
Game	0.06% (game damages on stems recorded by the national forest inventory for the period 1997-2007 in Galicia)	0.0006	browsing and peeling	Report from Irstea (Ballon and Hamard 2003) ; using data from Aquitaine	0.02	0.0007
Pitch canker	Around 0.25% of maritime pine area estimated to be affected by eradication measures (2008-2015)	0.0025	quarantine measures	Felling of all trees affected. Loss of 50% in price	0.5	0.0681

² See Equation 1: $W_{Hi} = \frac{P1_{Hi} \times P2_{Hi}}{\sum_{i=1}^n P1_{Hi} \times P2_{Hi}}$

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Supplementary appendix to the article “Multi-criteria analysis to compare multiple risks associated with management alternatives in planted forests”, by Margot Régolini, Céline Meredieu, Hervé Jactel, Ander Arias-González, Manuela Branco, Alejandro Cantero, Amélie Castro, Jean-Yves Frayssé, Barry Gardiner, Andrea Hevia, et al. Forest Systems Vol. 29 No. 2, August 2020 (<https://doi.org/10.5424/fs/2020292-15660>).

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