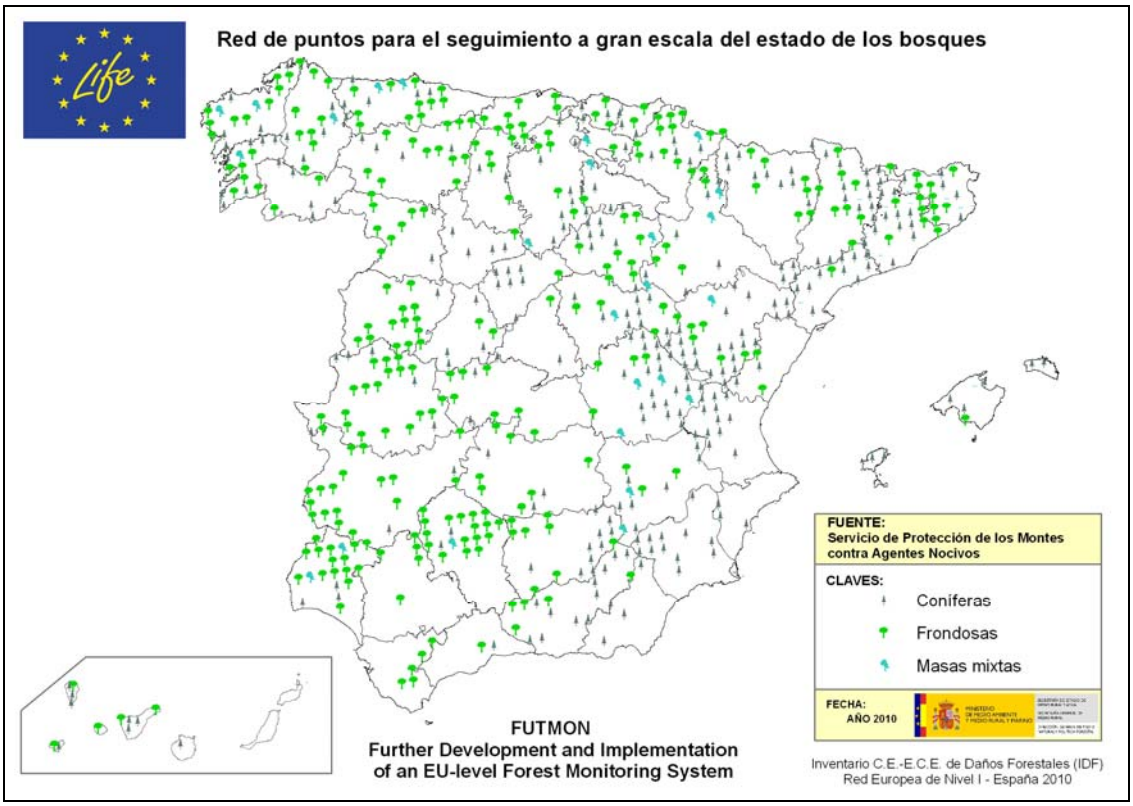
RESULTS OF SPANISH FOREST CONDITION SURVEY 2010

SUMMARY (ENGLISH TRANSLATION)

MINISTERIO
DE MEDIO AMBIENTE
Y MEDIO RURAL Y MARINO

SECRETARÍA DE ESTADO DE MEDIO RURAL Y AGUA
SECRETARÍA GENERAL DE MEDIO RURAL
DIRECCIÓN GENERAL DE MEDIO NATURAL Y POLÍTICA FORESTAL

SUMMARY OF RESULTS



Map showing the location of the 620 FutMon large – scale plots in spain

General results show that in 2010, 85,4 % of the sampled trees looked healthy: they correspond to defoliation classes “0” and” 1 (between 0 and 25% of leaf volume loss). A 12, 2% of the trees pertain to classes” 2” and” 3”, with defoliation levels higher than 25%. These values show a clear improvement if compared to previous years.

Regarding the evolution of defoliation and discolouration levels for conifers, broadleaves and for the whole group of species between 1987 (1st Inventory) and 2010 for Iberian Peninsula and Balearic Islands (since 1994 including data from Canary Islands), results in 2010 show a general recovery process which is more noticeable in the case of broadleaves, with the best global values of the last years.
Throughout the Mediterranean area, parameter defoliation is much more useful than discolouration for indicating the health condition of forests, as discolouration is in many times influenced by the local conditions of the forest site.

Spain results can have a certain geographical interpretation. The observed variations show some regional differences which can not be attributed to methodological errors, as the results have been generated by field teams which have been trained in the same way, and whose works have been carried out in

the same period of year, with an homogenised methodology, and with continuous intercalibration routines.
Looking at the percentages of damaged trees in the IDF – 2009 and IDF – 2010, and considering the differences between these two inventories (it is assumed that changes lower than 5% are not indicating a real modification in forest condition) we can notice, through the values obtained, a clear improvement in most of the regions, highlighting Asturias, Catalonia, Andalusia and Valencia. There are no Autonomic Communities showing clear symptoms of decline.

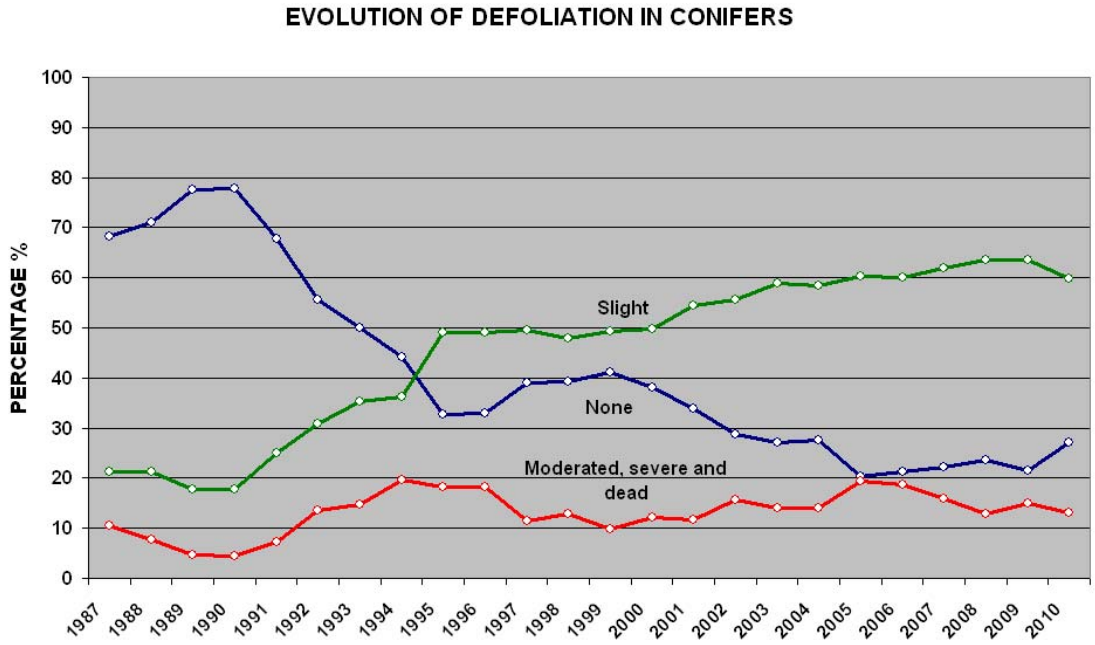
CHANGES IN DAMAGE PERCENTAGE BY REGIONS

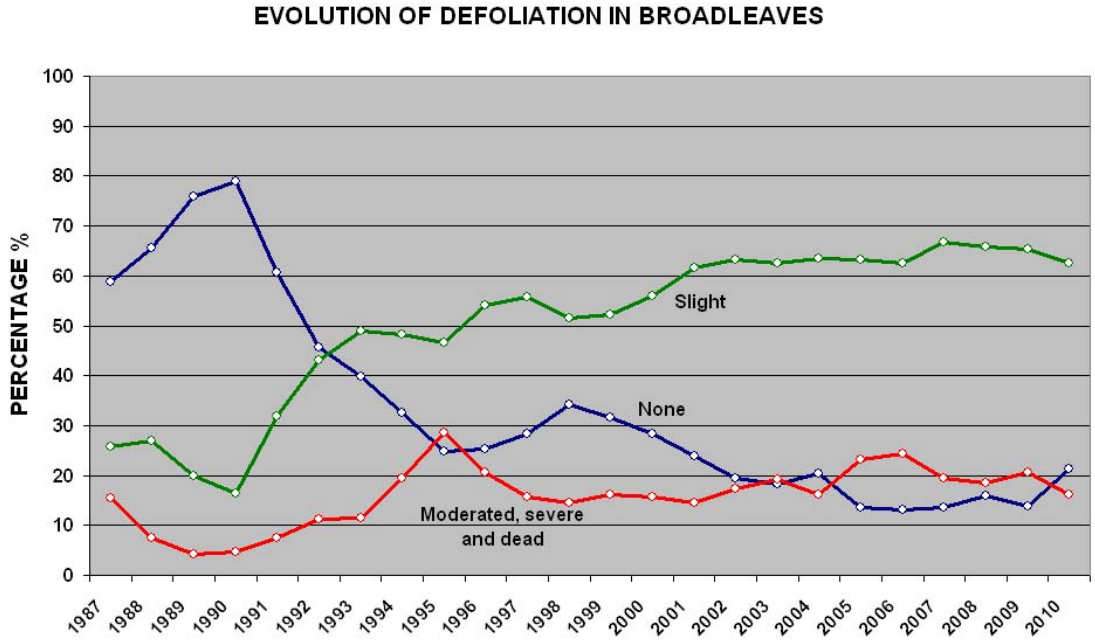
	2009		2010		2010 - 2009
	Classes 0+1	Classes 2+3	Classes 0+1	Classes 2+3	Classes 2+3
Andalucía	82,77	13,48	89,51	8,01	-5,48
Aragón	90,34	9,33	92,66	7,28	-2,05
Asturias	76,39	21,30	77,08	9,95	-11,34
Baleares	67,13	31,94	73,61	25,46	-6,48
Canarias	68,91	30,45	70,19	29,81	-0,64
Cantabria	84,72	3,24	94,91	4,17	0,93
Castilla-La Mancha	83,88	14,97	82,29	13,16	-1,81
Castilla - León	89,50	10,08	91,13	7,75	-2,33
Cataluña	63,87	35,31	68,91	27,47	-7,84
Extremadura	87,69	11,65	89,11	9,85	-1,80
Galicia	71,39	21,31	77,72	19,31	-2,00
Madrid	77,78	22,22	80,56	19,44	-2,78
Murcia	95,49	4,17	98,96	1,04	-3,13
Navarra	94,21	5,32	92,36	5,32	0,00
La Rioja	96,88	3,13	93,75	6,25	3,13
País Vasco	96,39	2,78	96,67	3,06	0,28
Comunidad Valenciana	85,75	8,99	96,27	3,73	-5,26
Total Spain	85,58	14,42	82,23	15,76	1,34

ANALYSIS OF THE MAIN TREE SPECIES

The analysis of the four forest species more represented in the inventories (two conifers and two broadleaves: *Pinus sylvestris, Pinus halepensis, Quercus ilex and Quercus pyrenaica*) and the evolution of their defoliation levels, shows the following results:
During year 2010 all of the species show an increase in the percentage of healthy trees, except *Pinus sylvestris,* which remains in the same levels as in 2009. Concerning damaged trees, the species which have recovered better are

Quercus ilex and *Pinus halepensis*. *Quercus pyrenaica* also improves, although to a lesser extent, whereas *Pinus sylvestris* remains practically with the same proportions as the previous year.





MAIN DAMAGES REPORTED DURING THE ASSESSMENTS

These are the main damages, biotic or abiotic, recorded during the field assessments carried out in all the large scale plots (Level I) located in all regions in Spain in summer 2010, together with a shallow indication of their location. This list does not imply in any case a characterization of the intensity

or the distribution of processes of forests decline is only fruit of the assessments carried out by the field teams:

Biotic damages (pests, diseases and parasitic phanerogams)

Insects

- Pine proccessionary caterpillar, *Thaumetopoea pityocampa* continues being the most extended biotic damaging agent in Spain, and *Pinus nigra* is (as usual), the most affected tree species, although, in general lines, damages caused by this lepidopteron in 2010 are much lower if compared to the ones registered in the previous years.
- Regarding bark beetles, 2010 has been harder than previous years. Bark beetle populations are associated to the presence of wood and debris in pine forests. Also the weakening of trees causes the bark beetles colonization. In this sense, the unfavourable weather conditions suffered during 2009 (mainly drought) in large areas of the Iberian peninsula caused death and weakening of pine forests and thus they were more vulnerable to the bark beetle attacks suffered later, in 2010. There are *Ips acuminatus* and *Ips sexdentatus* damages in forests stands of main tree species *Pinus sylvestris*, only *Ips sexdentatus in Pinus pinaster* stands, and *Tomicus destruens* & *Orthotomicus erosus* in *Pinus halepensis* stands.
- This year, the defoliations caused by caterpillars in *Quercus* genus have not been noticed, except for some moderate defoliations in the centre of the country and in the eastern part of Majorca island, caused by *Lymantria dispar.* Some relevant attacks have been noticed in oak in *Catalonia* region*, caused byTortrix viridana*.
- Similar damages to previous years of dead branches, branchlets caused by branch borer *Coroebus florentinus* and/or agrilus sp.
- Damages caused by *Cerambyx* sp. and *Oryctes nasicornis* are frequent and severe in several locations in Sierra de Tramontana (Majorca) being the damages still in expansion.

In *Quercus* stands (mature “dehesas”) of central west Spain, damages are also frequent but without any changes if compared to previous year. There is a *Quercus pyrenaica* stand in Madrid region where the population is increasing notably causing severe damages in isolated trees and in little forest stands.

Damages due to the joint action of decay fungi and *Cerambicidae* insects still are causing the breakage of numerous branches and stems in old “dehesas” in the north of Extremadura region.

- The gall maker *Dryomyia lichtensteini* is frequent in all types of holm oak stands, but in lower levels if compared to previous years. On the other hand, *Asterodiapsis ilicicola* is starting to be noticed, more frequently each time, generally associated to *D. lichtensteini.*
- Defoliator *Gonipterus scutellatus* is present in almost all *Eucalyptus globulus* stands located in Galicia, Asturias and Cantabria being the damages important (similar intensity as in 2009).

- The levels of wood borer *Phoracantha semipunctata* have experimented a remarkable descent, due to the rain fall and the cleaning operations (removal of trees which died last year).
- Presence of miner *Rhynchaenus fagi* and *Phyllaphis fagi* in *Fagus sylvatica* stands located in the north of Spain
- On alder-trees (*Agnus glutinosa*), field teams have continued noticing damages caused by defoliator *Agelastica alni*, which are this year of similar intensity to the ones observed in 2009 in Asturias region, although damages are more intense in scattered trees in the middle of forests than in trees forming galleries in river shores.
- This year there have been detected punctual defoliations in *Crataegus monogyna* trees, distributed in punctual zones throughout Iberian Peninsula, caused by defoliator *Aglaope infausta*, although in much lower levels than previous years.
- On *Salix atrocinerea* some damages have been detected due to *Phrathora laticolis* in the Northwest of Spain.
- *Xanthogaleruca luteola* still causes remarkable defoliations in elms (*Ulmus minor* and *U. pumila*) in Andalucia region.

Fungi

- Damages caused by *Sirococcus conigenus* on *Pinus halepensis* trees are similar to last year, light and not very important, in locations like water-courses and hillsides with favourable exposure.
- The damages caused by defoliator fungus *Thyriopsis halepensis* that ocurred with higher or lower intensity in *Pinus pinea* and *P. halepensis* stands located in the centre and south of Spain, are maintained in low levels, managing to be practically non-existent in most of the areas. They are of higher intensity in areas of Valencia region.
- Needle fungi as *Scirrhia* sp., *Mycosphaerella pini*, *Naemacyclus* sp., and *Lophodermiun pinastri* or branchlet fungi, like *Sphaeropsis sapinea* frequently cause “flash” shaped damages and death of needles in *Pinus radiata* crowns, being the levels this year very low if compared to previous years.
- The presence of oidium (Microsphaera alphitoides) affects in general to *Quercus petraea Q.robur* and *Q. pyrenaica* stands located in the north of Spain (Galicia, Asturias, Basque country and Cantabria). It jhas been also noticed in areas in central Spain affecting wet areas in the deeper valleys.
- The presence of canker of chestnut-tree (*Cryphonectria parasitica*) on *Castanea sativa* trees continues being generalized in the North of Spain.
- Some young *Eucalyptus* reforestations in the north of Spain (Galicia) have been found affected by the foliar fungus *Harknessia* sp. They mainly affect the lower part of the crown and manage to cause, in some trees, important defoliations.
- The damages caused by the Dutch elm disease (*Ceratocystis novo-ulmi*), are generalized year after year throughout the Iberian Peninsula and Balearic islands. In 2010 there has been an important and generalized increase in the frequency and intensity of damages.

Parasitic phanerogams

- Important infestations by Viscum album are still found in several areas of Iberian Peninsula. They are responsible for the weakening of the colonized trees and favour the entry of other pathogen agents which in some cases can cause the death of the tree.
- *Juniperus oxycedrus* and *J.thurifera* stands in Aragón region, are affected by the combined action of branchlet fungi (*Gymnosporangium sp.*) and dwarf mistletoe (*Arceuthobium oxycedri*).

Meteorological agents

The agent which affected most to defoliation levels of Mediterranean tree species during past years, drought, caused little damage in 2010 due to the favourable weather conditions at national level. Therefore, drought damages recorded in 2010 are just consequences of previous periods of hydric stress.

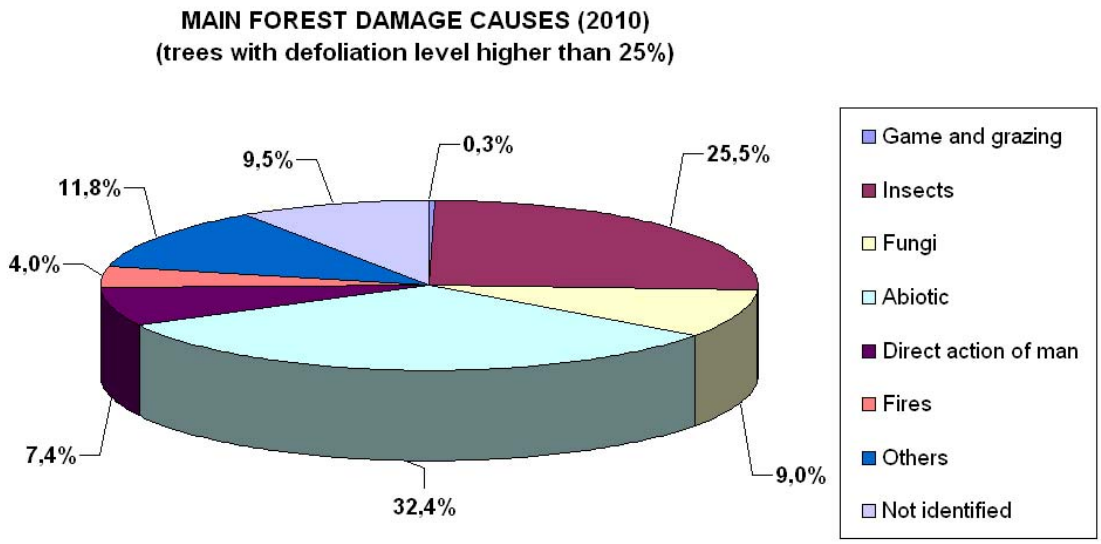
Damages (breakage of branches and stems) caused by storm and winds have been frequent due to the strong winds registered in winter and spring. In some areas these damages have been more severe due to the effects of snow.

Pollutants

The application of salt in mountain roads in winter caused isolated damages of certain severity.

Other damages

- The symptomatology known as "Seca of Quercus", continues being noticed, specially in those locations which were more affected in previous years, of Holm oak and cork oak
- There are continuously frequent *Alnus glutinosa* trees with branches, part of the crown or the whole tree dead (decay symptomatology), presumably because of a vascular disease which causes a sudden death of the affected part, remaining in many cases the leaves still on the tree. These damages have been observed more frequently in alder stands situated in mountain areas, though also has been noticed (even more than in previous years) in alder stands in river banks.
- The high asymptomatic mortality of fir trees (*Abies alba*) in the Pyrenees noticed during last years, seems to have been reduced or at least remained stable.
- The decline process of vegetation at Garajonay's National Park remains happening gradually. Due to the similarity of symptoms with the action of some vascular fungi, there exists a theory of a possible fungi origin of the problem (*Phythophtora* type), although this is not confirmed. Nowadays, apart from the fungi origin, it is thought that may be anyway related to the hydric stress, because in dry years the extension of the infestation has been higher.



CONCLUSSIONS

Results obtained after 2010 Inventory show a clear process of improvement if compared to 2009. A percentage of 85,4% of surveyed trees looked healthy (comparing to the 82,3% of previous year). A percentage of 12,2% of the trees were included in classes" 2" and" 3", indicating, with clear devitalisation whereas in 2009 this percentage was 15,7%. The number of damaged trees has decreased noticeably, whereas the number of dead ones remained stable. This general improvement is slightly less noticeable in conifers, with a percentage of 86,9% of healthy trees (85,1 % in the previous year) than in broadleaves (83,3% in 2010 and 79,3% in 2009).

The mortality of trees (2.0% dead trees of the total sample, the same percentage as in 2009) was due to decline processes derived from the strong water shortages which affected trees in previous years as well as to felling operations (frequently sanitary cuts).

Regarding the possible damaging agents, a general decrease of all of them is detected. This is especially remarkable in the case of damages due to drought, and in a lower degree to damages by insects. Damages caused by pine processionary caterpillar (*Thaumetopoea pityiocampa*) and spring defoliators on broadleaves, decrease specially. Records related to forest fires and to action of man increase slightly as well as records of borers (*Cerambicidae* and *Buprestidae*), cochineal insects and some punctual attacks by insects which are not very relevant at global scale.

The decline processes in *Pinus radiata* and *Pinus nigra* stands near the Cantabrian coasts increase remain the same as well as the general presence of chestnut blight and chestnut ink disease in chestnut stands.

Mistletoe infestations continue to follow a worrying rising trend and the impact of the decline process affecting alder forest stands near the Cantabrian coasts is confirmed. Last but not least, the increase of some punctual decline processes in some juniper stands must be quoted. There is a certain increment of damages related to *Seca* syndrome.

The importance of atmospheric pollution in the evolution of forest condition is a factor which can not be quantified directly, as it is frequently disguised by other kind of processes which are more apparent. However, its role (in combination with other agents), contributing to the degradation processes of the forests falling under their influence, can’t be denied.