



FORESTS LANDSCAPES AND GLOBAL CHANGE Bragança - Portugal, September 21 to 27, 2010

## Landscape changes and wildfire behaviour: New fire scenarios in Spain

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## Fire problem in Europe

# Recent territorial trends & Global change

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Extreme weather situation, June 9, 2008



#### Increase of the ignition risk



#### Increase of the propagation risk <sup>2</sup>

## Driving forces for landscape changes





Rural depopulation Poor management Urban spread

Large and continuous areas with fuel models of high risk

Wildland-urban interfaces

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## Landscape changes & fire regime



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Maintained rural landscape



Large and continuous areas with fuel models of high risk



Wildland-urban interfaces



## Fire scenario definition

Territorial sphere which features shared characteristics in the initial conditions and possible evolution and impact of wildfire

Instrument for the establishment of homogeneous strategies of wildfire prevention and extinction

Fire scenarios are defined at the national, regional and local scale (different objectives and methods)







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#### Settlement model





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#### Settlement model





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#### Forest ecosystem

Fuel model related hazard Physiography

Potential propagation related hazard = capacity of the physical environment

Flammability / Combustibility

Slope range





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Legend

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all other values> Escenario, Descrip 1, Sterres y marines forestales del literal gallego 2. Mosaico agrefatestal de las mentes, certas y chaos galegos 3. Machine, sierras y tierras allas forestates del Machine Gatalos-Jeone 4. Mosaico agrofarestal del Macizo Galaico Leonés y de la penillanose gallega 5. Mossico agrefatestal de las marinas y las reses cantituiças 6. Machine y sierras forestales cantilitions 7, Sierras y valles agroforestales vasco-cartéto R. Montes vesces 9. Fosas, valles y concas pinenaico-cantificitos 10, Campiñes, Banos y giada agrícolas de la Depresión del Ebro y la Cataluña interior 11. Muelas y dros émblios forestales de la Depresión del libro 12, Siemes pirenaicas 13, Meckos y elles sieres pireneices 14, Sierras, cuestas y conces agroforestales de la Cataluña interior 15. Sierres Haraies y prelibraies de Calabula y Castellin 16, Lience y glade dellitoral mediantines ariental 17. Campifes, vegas, fience y páramos de la Cuenca del Duero 10, Mossico agreforestel de los pásseus detriticos castellano-leoneses 19. Montañas Poreciales Ibéricas 20. Montañas y altos accolorectaios ibéricos 21, Glecis, llenos y complifios de los monteños ibéricos 22, Valles intramontañosos, glacis y páramos de las sierras ibéricas 23, Paramenas y siemas agroforestates ibéricas 24, Sierres y mueles ibéricas 25. Deherar y labradica de la penillanare salinativo-can orana 28. Arribes del Duero 27. Term de cineres 28. Mossico agraforental de los piedemontes de la Contiliera Central 29, Mackey y sierras forestales de la Contillera Central 30, Dehesas y pastituies de los piedemantes de la Costillera Central 21, Campos y prados de los valles y piedemontes de la Conditiera Cantral 22. Debeses de la peoffeman estremelle central 22, Campifica, Bance, veges y péramos de la submesete metidional 24. Sierne v valles forestales de los Mortes de Taledo y la centiterum estremeña. 26, tierras, cervas y lignas agraforestaias de los Montes de Toledo y la pendianora estremeña 26, Valles, heyes y large billio-leventings 37, Sierras foresteles leventinas 20. Sienas y hoyas agroforesiates levertinas 29, Montes, dehesas y pastos de Sierra Morena y de la penillanum estremeña meridional 40, tilemas y penillananas agroforestates de Sierra Morena. 41. Herres y valles forwiteles de Herre Morene. 42, tilemas agrofarestales bélicas 📕 43, Mexicos y sierres forestales bélicas 64, Campifica, vegas y llanos de la Depresión del Guadalquivir 45, Lience y martamas del Moral altéritor-andeixa 46, Macipos y sierras forestales de Grazales e-Ronda 47. Mossico agriforentei dei Itaralia editerrareo endeluzi 40, Lianos y giada dell'itoral mediterratineo-andaluz 49. Siernes forestales de las Balegres 50, Lianos y siemas agriculas de las Baleares 51, Marines forestales de Mallerce y las Pilluses 52, Moseico agraforestal menorquin 99, Ambitos urbanos y metropalitanas



#### **CONCEPTUAL BASIS = WILDFIRE GENERATION**

The concept of *wildfire generation* is associated with the different stages of landscape evolution. It relates to a model of wildfire evolution towards a situation of predominance of large wildfires, which show high intensity and overwhelm control capacity. All this related to the variations of available fuel, framed within a determined spatial and temporal context, which prompt changes in action strategies

**1st Generation**: - Area with continuous fuel load - Recent abandonment of farmlands

(Quite large wildfire perimeters)

**2nd Generation**: - 10-15 years of abandonment of agricultural and forest management - Fuel continuity and homogeneity (shrubland)

(High fire propagation intensity and spread)

**3rd Generation**: - High fuel density and vertical continuity (*Crown fire out of control*)

**4rd Generation**: - Wildland-urban Interfaces - Fuel continuity and estates (Great fire intensity and jumps)



### ATRIBUTE AND DATA SELECTION

DEFINING ELEMENTS	INTERVENING FACTORS	SOURCES OF INFORMATION
PROPAGATION CAPACITY	<ul><li>Fuel load and continuity</li><li>Slop</li></ul>	<ul><li>Cartography of fuel models (Forest Map)</li><li>DTM</li></ul>
WILDFIRE CHARACTERISTICS	<ul> <li>Intensity, propagation speed, simultaneity</li> <li>Burned area</li> </ul>	<ul><li>* Wildfire database</li><li>* Wildfire perimeters</li></ul>
TERRITORIAL CONTEXT	<ul> <li>Agricultural abandonment</li> <li>Intensity of forest management</li> <li>Presence of WUI</li> </ul>	<ul> <li>* Crops and land use map</li> <li>* National Forest Inventory</li> <li>* Settlement map (TRAGSATEC)</li> </ul>



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## ANALYSIS UNIT = Drainage basin

Automatically calculated: 4.5 km<sup>2</sup>, average area

#### **MANAGEMENT UNIT = Forest massif**

Homogeneus biogeographic unit which is delimited by natural or agricultural features, and is suitable for carrying out forest management or defence against wildfires actions



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### Mapping the components of regional fire scenarios

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#### LAND USES: > 75 % forest land





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### LAND USES: % farmland





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#### **TERRITORIAL DYNAMICS: Agricultural abandonment**





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#### **TERRITORIAL DYNAMICS: Agricultural abandonment**





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#### **Territorial Diagnosis Map**







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#### **Forest management:**





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#### **Settlement model:**





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#### **Identifying wildfire generations:**

- 1st and 2nd Generations: Intensity of agricultural abondonment related to % farmland
- 3rd Generation: fuel continuity + forest management
- 4rd Generation: WUI + fuel continuity





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