Landscape changes and wildfire behaviour: New fire scenarios in Spain

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Fire problem in Europe

Recent territorial trends & Global change

Increase of the ignition risk

Increase of the propagation risk

Extreme weather situation, June 9, 2008
Driving forces for landscape changes

- Rural depopulation
- Poor management
- Urban spread

→ Large and continuous areas with fuel models of high risk
→ Wildland-urban interfaces
Landscape changes & fire regime

New Fire Scenarios

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)


**Settlement model**

- Predomina urbano
  - Entorno urbano exento de arbolado

- Predomina agrícola
  - Población en diferentes parcelas en zona agrícola

- Predomina forestal arbolado
  - Núcleos de población sobre áreas arboladas
  - Edificios dispersos sobre áreas arboladas
  - Edificios aislados en áreas arboladas

- Entorno urbano con arbolado en conectividad con superficie forestal
Settlement model

UNIDADES DE PAISAJE: Densidad de Interfaz Urbano-Forestal
Forest ecosystem

Fuel model related hazard + Physiography related hazard = Potential propagation capacity of the physical environment

Flammability / Combustibility

Slope range
National Fire Scenarios

(1:1,000,000)

Landscape character assessment units & Fire scenarios

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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)*

4th Generation: - Wildland-urban Interfaces
   - Fuel continuity and estates
   *(Great fire intensity and jumps)*
## ATRIBUTE AND DATA SELECTION

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Regional Fire Scenarios (1:50,000)

**ANALYSIS UNIT = Drainage basin**
Automatically calculated: 4.5 km², average area

**MANAGEMENT UNIT = Forest massif**
Homogeneous biogeographic unit which is delimited by natural or agricultural features, and is suitable for carrying out forest management or defence against wildfires actions
Regional Fire Scenarios

(1:50,000)

Mapping the components of regional fire scenarios
Regional Fire Scenarios

(1:50,000)

LAND USES
- > 75% forest land
- % farmland
- % unproductive land

TERRITORIAL DYNAMICS
- % agricultural abandonment

Cluster analysis

Exploratory basin grouping
(TERRITORIAL DIAGNOSIS MAP)

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Regional Fire Scenarios

(LAND USES: > 75 % forest land)
Regional Fire Scenarios

(1:50,000)

LAND USES: % farmland
Regional Fire Scenarios
(1:50,000)

TERRITORIAL DYNAMICS: Agricultural abandonment
TERRITORIAL DYNAMICS: Agricultural abandonment
Regional Fire Scenarios
(1:50.000)

Territorial Diagnosis Map

Cubiertas de suelo y dinámicas
- Suelo agrícola con abandono consolidado
- Suelo urbano e improdutivo
- Suelo forestal de baja densidad y abandono
- Suelo forestal
- Suelo agrícola dinámico
- Suelo agrícola en retroceso
- Unidades de gestión
Regional Fire Scenarios

(1:50,000)

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Forest management
Settlement model

WILDFIRE GENERATION
Regional Fire Scenarios

(1:50,000)

Forest management:

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Regional Fire Scenarios
(1:50,000)

Settlement model:

Legend:
- Green: Agricultural and leisure areas
- Orange: Mixed forest and leisure areas
- Brown: Sierra forests and leisure areas

Legend for Generation 4:
- Units of management
- Cuenca > 80% urban
- Cuenca > 50% urban / > 30% forest / 75% TFC/TOT
- Cuenca > 30% forest / 75% TFC/TOT contiguous to Cuenca > 50% urban / > 30% forest / 75% TFC/TOT
- Cuenca > 30% forest / 75% TFC/TOT (No generation 4)
Identifying wildfire generations:

- **1st and 2nd Generations**: Intensity of agricultural abandonment related to % farmland

- **3rd Generation**: fuel continuity + forest management

- **4rd Generation**: WUI + fuel continuity
Regional Fire Scenarios

(1:50,000)

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- Forest management
- Settlement model

REGIONAL FIRE SCENARIOS = Validation through fieldwork + WILDFIRE GENERATION

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Regional Fire Scenarios

(1:50,000)
Thank you!

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