FIREfficient
Operational tools for improving efficiency in wildfire risk reduction in EU landscapes

This project is co-funded by the European Union

Operational tools for improving efficiency in wildfire risk reduction in EU landscapes FIREfficient

Deliverable: Proceedings of the International Workshop on Wildfire Risk Assessment and Land Planning

(Barcelona, 24 September 2014)

FOREST SCIENCES CENTRE OF CATALONIA
Generalitat de Catalunya
Departament d'Interior
PAU COSTA FOUNDATION
EFI
KING'S College LONDON
University of London

Workshop: Solsona, 12-13 June 2014 (Action 2.3.)

The aim of the this international meeting on **Integrating wildfire risk in the urban and spatial planning** was to discuss about the tools and innovative practices favouring the integration of fire risk management into the territory planning. Experts from different disciplines were invited to participate actively during the 1.5 days of the project.

The agenda of the workshop was composed by three subsequent parts:

- Part 1st. How wildfire risk affects spatial and urban planning?
- Part 2nd. What tools we have for the risk assessment and how we integrate natural hazards risks into land planning?
- Part 3rd. Challenges and opportunities for an effective integration of wildfire risk management in the urban and spatial planning.

Annex 1 contains the complete programme of the Workshop.

The Second part of this Workshop will be held during the International Course "III EuroMediterranean Meeting on Wildfires. Wildland urban-interface wildfires", organised by the CUIMPB (Universitary International Consortium Menéndez y Pelayo Barcelona – Ernest Lluch Center).

Annex 3 contains the detailed programme of this international course.

How wildfires risk affects spatial and urban planning?

WUI wildfires

During last decades, wildfire behaviour has changed due mainly to changes in landscape. Fuel accumulation on the landscape caused both by land abandonment and systematically implemented policies of fire exclusion are aggravating the fire risk in the Mediterranean Basin. This situation with the growing and sprawling homes in wooded areas brings on highly risk wildland urban interface zones (WUI), with not only forests compromised by flames, but also people and properties. WUI wildfires are also known as 4th Generation Wildfires.

Such emergencies take another dimension to the firefighting services, but also for the population in general, as well as for the administrations, journalist, etc. Consequently, they have gone from a Forest Emergency to a Civil Defence Emergency. Examples of WUI wildfires are very recent: La Jonquera (Spain, 2012), Màlaga (Spain, 2012) or Athens (Greece, 2009).

Lack of integration of wildfires into land and urban planning

Fire element is not being introduced as a risky factor at land and urban planning. Management of the landscape needs to go beyond the forest sector; other actors are also crucial intermediate in decision making: planners, architects, local authorities, teachers, etc. WUI use must be considered differently than urban or forestry use.

In any case, might be wildfires considered as a factor modelling European landscapes? This simple question has complex solutions, not always shared and viewed the same way by the agents who manage

the landscape. Although we manage the landscape, wildfires will always occur in our landscapes. So, we should work on the tolerance and resistance of landscapes units in order to preserve these systems.

Society risk awareness and risk perception

Are societies prepared for WUI wildfires? Are people conscious of the risk when living in urban interface landscapes? Campaigns launched to society during last years have enhanced the "zero fire" message, focusing only on the suppression of fire. This message should ship from understanding "fire as the problem" to the "fire as a symptom of a more complex problem".

Large wildfires are described as fires out of extinguishing capacity, because of their velocity and intensity. Experts also define the "Fire Paradox": effective management of low-intensity fires makes you more vulnerable to high-intensity fires. Societies are not planning things deeply, ignoring the existence of a latent risk unless it is very evident.

At present, politicians prioritize actions reporting immediate benefits that must be visible within a maximum period of 4 years (in Spain). Short-term action can minimize the risk of fires today, but it forms a more potent risk scenario for the future. Measures to minimize the risk of fire are slow and their effects are obtained gradually over a period much longer.

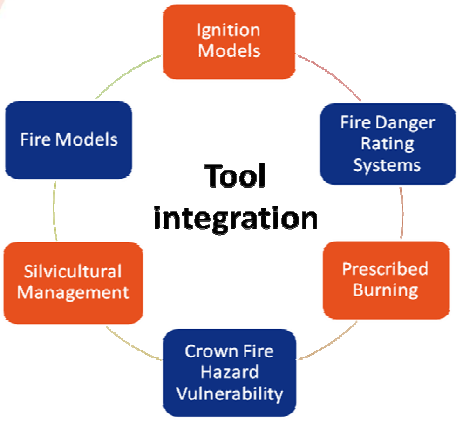
There is a huge technical knowledge, but a worrying lack of capacity to implement it and protect it within a regulatory framework. Its implementation involves some ecological, economic or social impacts not really accepted in the socio-political context. Revitalizing and capitalizing all this knowledge transcends the forestry sector. Groups linked to the field of sociology and psychology have to enlist in the process and become the safe-conduct to canalize the implementation of technical knowledge.

What tools we have for the risk assessment and how we integrate natural hazards risks into land planning?

Review and evaluations of knowledge to measure extreme fire spread risk at forest and landscape level planning (Action 2.1)

A compilation of the **existing fire hazard/risk assessment tools and fuel management tools for fire hazard reduction,** as well as to **describe their real utility** as an input in the decision making process.

The review will **describe the existing and potential links between the different tools**, providing an **integrative view** of the processes and identifying the strengths and weaknesses of their applications.



Building resilience for wildfire
Ensuring that fires are not so aggressive

- ***Crown fire hazard assessment tools***

Give information on the structural characteristics of the forest stand and its relationship with the vulnerability to generate and maintain high intensity-crown fires. Therefore, **they are useful to assess crown fire potential behaviour and guide forest management to reduce risk of crown fires**.

Their utility depends on the type of data used to assess crown fire hazard:
- *Crown data*
- *Forest stand data*

- ***Silvicultural treatments and forest management for fuel reduction***

There is a need of a more widespread **practice of preventive silviculture that modifies forest structures in order to make them more resistant to high intensity fire**.

- ***The "fire-smart silviculture"***
  - decrease accumulation of surface fuels and ladder fuels
  - raise the canopy base by pruning the trees and removing ladder fuels
  - thin the stand to decrease foliage density
  - maintain large trees of fire resistant species

- ***Prescribed Burning***
  - Prescribed burning (PB) is the careful **application of fire** under mild weather conditions **to meet a defined management objective being the reduction in fire hazard** the initial motivation of using PB across many areas of the world.
  - Direct relation with forest management, in fact PB it is a forest management tool.
  - Their application modifies fire behavior and spread.
  - They can be validated using fire behavior and spread simulators

- ***Fire Danger Rating Systems.***

Fire Danger Rating Systems (FDRSs) have a primary objective of assessing fuel and weather conditions, and provide estimates about fuel flammability and the potential fire behavior for every allocation over areas under those conditions.

- Their utility depends on the temporal framework
  - Daily risk maps
  - Historic analysis vs historic fire regime
  - Future long term evolution (Cchange)
    - KBDI/FWI/NDFRS/McArthur Index
    - EU - uses EFFIS system at 10, 16, and 25 km resolution

- ***Fire Ignition Modelling***

Ignition models have as primary objective to understand the temporal and spatial patterns of fire initiation.

No clear distinction between fire ignition models and fire occurrence models:

- ***Fire behavior/spread models***

Fire behavior models are used to understand fire related variables according to fuel types, fuel distribution, and surrounding conditions.

Fire spread models (with a fire behavior model as engine), simulate fire evolution, on time and space, or only on space (if design to simulate multiple fire events, and generate risk maps).

They are the middle link in between the other tools for fire hazard/risk assessment, and can be feed from tools like ignition models, fire danger systems.

They can validate (on a computer) prevention measures as forest management rules, prescribed burning etc.

- *FBMs - e.g. Behave Plus, Nexus, Fofem (stand level)*
- *Single fire events - e.g. FARSITE*
- *Multiple fire events - e.g. MEDfire etc.*

Integrating Risk in Planning and Mangement. Obstacles and Hindances (Action 2.2)

Key message of IPCC / SREX (Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation) is that central position in risk management in future is **adaptation** and **mitigation.** These are the obstacles and hindances

- ***Economic hindrances***. Adaptation often means high investment but savings/profits come in: later, at long term and in small instalments or portions

- ***Environment hindrances***. Dynamic growth vs adaptation goal
  - actual processes determined by actual climate
  - risk level determined by future climate
  - Long-term production

- ***Information hindrances***
  - use of information only after incident
  - no disturbance - use of knowledge
  - change faster than knowledge
  - knowledge is forgotten

- ***"Psychosocial" hindrances***
  - e.g. climate change has no event associated with it
  - don't deal well with uncertainty
  - "creeping normalcy" - only visible after tipping point

- ***Political hindrances***
  - adapted alien species (e.g. Douglas fir) vs. natural regeneration
  - short rotation vs old growth elements
  - cheap monocultures vs mosaic/multi-species approach

Example of natural hazards risk integration into the land planning

- **"Fire Types" concept as a planning tool, Pau Costa Foundation**

When analysing historical fires, it becomes obvious that under the same topography and weather (synoptic situation) conditions, fire spreads following similar spread schemes. Fire Types are derived

from the analysis of common factors in these spread scheme. Then, future fires can be reproduced – simulators are a useful tool for this study-case. Based on this analysis, strategical management points or areas can be defined and managed in order to change wildfire behaviour. Application of this planning tool improves: (a) extinguishing system efficiency, (b) resistance of forests to fire and (c) fire prevention infrastructures. Case study: Wildfire typification at Alto Minho (Portugal). January 2012.

- **Local approach, Northumberland National Park**

Partnership approach and stakeholders engagement is necessary for understanding wildfire risk. Certainly, parallels in northern Europe -- use of fire may be economically viable/effective, but cultural concerns/perceptions override the facts.

- **Implementation of the forest fire risk into the urban planning process, Meteogrid**

Methodology based on LIDAR data (vegetation height, vegetation density and fuel load index) is used in Spain in order to calculate the wildland urban interface index (WUIX).

Challenges and opportunities for an effective integration of wildfire risk management in the urban and spatial planning

Challenges around knowledge, training and tools available

- Existing knowledge must arrive to the academy through the coordination of joint projects between different experts
- Need of a consistent cartography
- Transcale: region – municipality – urban interface area
- Faced with a fragmented view of the problem, a complementary view tranescalar, transmultidisciplinar and transtemporal is needed
- Technique, methodology, knowledge must be transferred to real world. Ways to transfer them must be found
- Connexion between *tool* and *decision-making*
- Go in depth into the study "cost-efficiency"
- Transverse, common and readable cartography for all agents
- Standardizing the response
- Standardizing information
- Standardizing training
- Re-education on fire

Challenge around legislative and policymaking processes

- Official and consequent definition of interface situations
- Integrated landscape management: cost of living at interface areas (return)
- Strengthen the role of municipalities
- Establish operating limits defense housing (selected) and policy support depending on the degree that can be defended
- Not fragmented structures
- What are the goals and how we perform them?

- Integrating land management policies in paying farmers established according to CAP (*Common Agriculture Policy*)
- Cost-benefit analysis - cost of management of a strategic forest management vs. cost of a fire

Challenges around society involvement and communication

- Be opportunistic: use high impact events to influence policy makers (e.g., 2002: Forest fire in areas of natural interest in the UK)
- Report of the economic costs of the intervention to extinction compared to the cost of maintaining active forest and farmland
- Sort sectors of the population in terms of its connection with the landscape (risk perception)
- Politically profitable non-fire, non-disaster: emphasize the crucial role of the structures supporting (a firefighter more)
- Education on good practices to live safe and sustainable manner that the demand landscape
- Incorporating psychological, social and humanistic component
- Perception "that will never happen to me" needs to be changed
- Report on the probability of an event occurring in the most understandable way possible, without creating confusion
- Getting the message of risk through influential people (mayors, natural leaders ...)
- Societies must assumption the risk: even as we strengthen administration and employ the best media before an episode of extreme conditions (e.g. droughts, heat waves, etc…), extreme wildfires will overtake us.
- The individual must become an active agent in the region. Sustainable exploitation and services provided by landscape represent the most efficient management.

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Annex 1. Workshop on Integrating wildfire risk in the urban and spatial planning: Review of knowledge and practices / Program

Deliverable: Proceedings of the International Workshop on Wildfire Risk Assessment and Land Planning

1st August 2014, Barcelona

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FIREfficient

Workshop on Integrating wildfire risk in the urban and spatial planning: Review of knowledge and practices

SECOND ANNOUCEMENT

12th & 13th June 2014
Solsona, Spain.

FOREST SCIENCES CENTRE OF CATALONIA
Generalitat de Catalunya
Departament d'Interior
PAU COSTA FOUNDATION
EFI
KING'S College LONDON
University of London

1. General Background

Wildfires are annually affecting thousand of hectares and are one of the major causes of wooded surface and forest functions lost all across Europe. **Under future climate change scenarios, all EU countries may undergo increased risk situations associated with fire affecting new areas that historically had not experienced significant impact from wildfire events and civil protection and global emergency management will therefore become increasingly important**. In this context, the footprint of high intensity and unprecedented wildfires is likely to increase, causing major socio-economic impacts.

In parallel, wildfire risk management strategies are currently experiencing significant improvement in efficiency and operational impact, primarily due to the targeted transfer of knowledge based on actual experience in various fields of fire prevention and fighting that are being shared between actors. **One of the most innovative knowledge in recent years is the development of anticipatory fire fighting and preventative strategies** based on detailed knowledge of fire behaviour patterns which offer a powerful tool for improving wildfire risk mitigation strategies from a cost-effective approach. These strategies are based on the prediction of risk at different spatial and temporal scales. These allow an effective use of available resources to cover locations in time and space offering more cost-effective potential for success (i.e. higher risk- higher potential for effective fire suppression). **Prior knowledge of potential future fire events in a territory allows the rational participation of the actors responsible for landscape management** (e.g. forestry and land planning administrations) in reducing fire risk and hazards.

2. FIREfficient project

The **FIREfficient** project aims to establish a sustainable platform for efficient exchange of available knowledge in which "lessons-learned" can be made available to relevant stakeholders and public agencies at EU level, dealing with innovative operational tools and means to integrate the prediction of potential fire events into emergency strategies and land-use planning.

The Project seeks to build capacity for planning developers to enhance the transfer of best practices and lessons-learned in wildfires to planning practices and processes, through a set of knowledge management strategies, addressing four main challenges:

- To capitalize the knowledge, tools and procedures to improve fire hazard landscape resilience in the context of different socio-economic environments within the EU from a cost-effective approach.
- To consolidate the methodology, data sources and enhance the comparability of the results from prior fire event assessments.
- To strengthen the performance of existing successful tools and procedures applied at best practice sites, and to enhance their transfer capacity at EU level.
- To promote the transnational cooperation of competent bodies for moving towards a common basis for the management of wildfire risk across Europe.

The project is co-financed by the Directorate-General for Humanitarian Aid and Civil Protection - European Community Humanitarian Office (ECHO). For more information: www.firefficient.ctfc.cat

3. Objectives of the workshop

The aim of the international workshop on **Integrating wildfire risk in the urban and spatial planning** is to provide a meeting point between experts in wildfire risk assessment and spatial and urban planning to deal with the challenges and opportunities for an effective integration of fire risk management into territory planning.

The agenda of the workshop is composed by three subsequent parts:

- Part 1st. How wildfire risk affects spatial and urban planning?
- Part 2nd. What tools we have for the risk assessment and how we integrate natural hazards risks into land planning?
- Part 3rd. Challenges and opportunities for an effective integration of wildfire risk management in the urban and spatial planning.

The agenda includes several presentations and round tables and an active participation of the audience is expected.

4. Agenda

June 12th . Plenary sessions

9:00h Registration
9:15h Welcome

Part 1st. How wildfire risk affects spatial and urban planning?

9:30h **Wildfire risk; current situation in a global change context all around Europe**. MARC CASTELLNOU, Fire analyst at GRAF and PCF Chairman
(The panorama of extreme event, fire generations, risk 0 does not exist, the need of an effective integration of wildfires in the land planning, social-economical dimension – the cost-effectiveness of this integration)

10:00h **New knowledge for new situation: the prediction of upcoming fire events. How it works? What the fire services need form the spatial and urban planning?** ORIOL VILALTA, CEO PCF
(Description and the innovative knowledge in the prediction of fire events and how is connected with the land planing)

10:30h Coffee break (Posters)

Part 2nd. What tools we have for the risk assessment and how we integrate natural hazards risks into land planning?

11:00h **Review and evaluations of knowledge to measure extreme fire spread risk at forest and landscape level planning**. Míriam Piqué, Sustainable Management unit at CTFC
(Results of the review done during the FIREfficient project)

11:20h **Obstacles and challenge for wild fire risk integration into land planning**. DANIEL KRAUS, Senior researcher and project leader at EFICENT / EDUARD PLANA, Forest Policy and Environmental Governance unit at CTFC
(Results of the review done during the FIREfficient project)

11:40h **Risk assessment in the land use planning; principles and tools.** RICARD PIÉ NINOT, Dr. Arquitecte. Catedràtic d'Urbanisme i Ordenació del Territori a l'Escola Tècnica Superior d'Arquitectura del Vallès (UPC) / Director de l'Institut d'Hàbitat, Turisme i Territori i professor del Màster d'Arquitectura del Paisatge. ETSAB-UPC
(functioning of land planning process; hierarchical relation within levels of planning, integration of cross-sectoral policies, the role of public bodies from municipalities to regions, the assessment of the cost-effectiveness of the alternatives ..).

12h **Examples of natural hazards risk integration into the land planning.** EDUARD PLANA, Forest Policy and Environmental Governance unit at CTFC
(real cases of effective integration of natural hazards management into the land planning. EU examples. Learning from how it works with other risks; avalanches, floods, etc)

- Case 1: *Local Wildfires groups approach* (UK) – ANDREW MILLER. Northumberland National Park.
- Case 2: *Swinley Forest Fire Case Study* (UK) - ALEKSANDRA KAZMIERCZAK. Research Fellow, School of Environment, Education and Development. University of Manchester.
- Case 3: DAVID CABALLERO (SPAIN). Area responsible at Meteogrid

- Case 4: to be defined

13:30h Lunch

Part 3rd. Challenges and opportunities for an effective integration of wildfire risk management in the urban and spatial planning.

15:00h World Café Presentation: Methodology, Themes and Aims

15.10h Discussion tables (parallel thematic session in 3 different working groups):

Topic 1. **Challenges around knowledge, training and tools available.** Moderator: JUAN CAAMAÑO, Pau Costa Foundation

Topic 2. **Challenge around legislative and policymaking processes**. Moderator: ALEX HELD, Senior researcher at EFICENT

Topic 3. **Challenges around society involvement and communication.** Moderator: EDUARD PLANA, Forest Policy and Environmental Governance unit at CTFC

15:15h First Round

15.45h Second Round

16:15h Third Round

16:45h Coffee break (Posters)

17.10h Presentation of the results of each group

17:30h Conclusions and closing the workshop. THOMAS SMITH, Lecturer in Physical & Environmental Geography, King's College of London

20h Social dinner

June 13th Field trip

8:30h Field trip – Examples of integrating fire risk assessment into land planning: 1994 wildfire event assessment and lessons learned. Example of identification wildfire behavior patterns. Implementation of the strategic areas for the wildfire prevention. GRAF

(Zone towards BCN city for transferring participants to the airport (afternoon flights)

16:00h Transfer to Barcelona (17h Airport approximately)

Practical information

- **Official languages** of the workshop are **English** and **Spanish**. **Simultaneous translation** will be available for participants
- A **Poster space** will be enabled during coffee breaks. If you are interested in exhibiting a poster, please send an e-mail to training@paucostafoundation.org

4. Site of the venue

Headquarters of the **Forest Sciences Centre of Catalonia**
Ctra. de St. Llorenç de Morunys a Port del Comte, km 2 25280 Solsona (Spain)
Tel. (+34) 973 48 17 52

http://www.ctfc.cat/on-som/?lang=es#title

5. Registration

The assistance to the workshop is free of charge and **will consider the order of inscriptions**. For the registration, please, send the Name, Institution (and optionally, responsibility inside the institution) and Email to the email address: training@paucostafoundation.org

Please, in addition, inform us if you like a reservation for the lunch of the day 1 (12€ cost approximately), social dinner of the day 1 (15€ approximately) and lunch of the day 2 (14€ cost approximately).

For more information:
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Contributors

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Annex 2. Workshop on Integrating wildfire risk in the urban and spatial planning: Review of knowledge and practices / Presentations

Deliverable: Proceedings of the International Workshop on Wildfire Risk Assessment and Land Planning

1st August 2014, Barcelona

Wildfire risk management and land use planning : Challenges and opportunities

Mr. Eduard PLANA BACH
Head of Forest Policy and Environmental Governance
Forest Sciences Centre of Catalonia

The own fire hazard (Photo: X.MATEU)

Growing with the fire risk: A band master in a school of strict education

In a changing context of risk : adaptative strategies are needed

WILDFIRE RISK MANAGEMENT

Integration socioeconomical and ecological driving forces affecting positively or negatively fire risk from vulnerability approach

SOCIAL DEMANDS & PERCEPTIONS

SUPRESSION & CIVIL DEFENSE

LAND-USE PATTERN

Forestry
Agricultural land and grazzing
Settlements

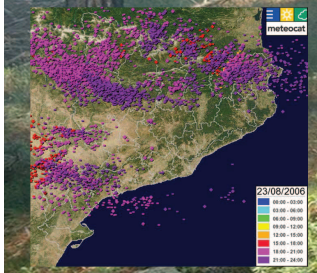
FIRE PREVENTION

Prevention plas
Prescribed burning
Investigation of causes
Social awarness

Where focus the attention: WILDFIRE RISK MANAGEMENT APPROACH

Ecology /

- From wildfire as the enemy: towards fire as a natural perturbation of the ecosystem "Living with wildfires" Birot Y. (Ed.)
- Efforts focused on reach more tolerant landscape patterns to fire perturbation from fire ecology perspective: harmonize forest owners – society – managers interests (overall in non profitability lands)



Bombers

Where focus the attention: WILDFIRE RISK MANAGEMENT APPROACH

Social /

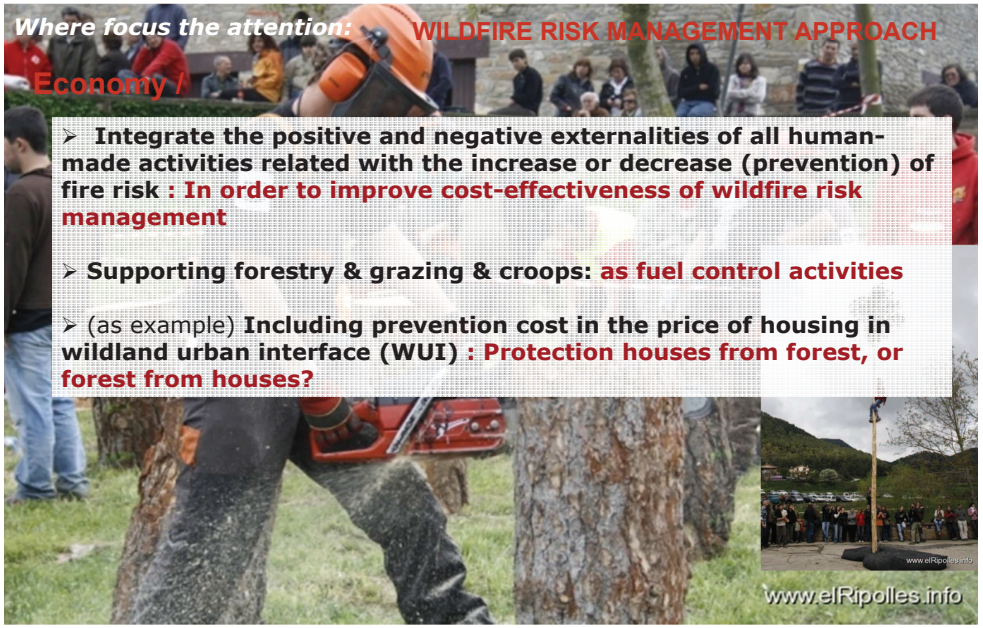
- **Improve society understanding of the role of fire in the ecosystem : Previous step to promote a strategy based in fuel management for tolerant landscapes patterns & low intensity fire management**
- **Improve society understanding of the exposition to risk : To promote self-protection attitudes and the own responsibility on ignition control**
- **The influence of mass media and opinion leaders in social perception: "Facts are facts but perception is the reality"**

FIREfficient: Workshop on Integrating wildfire risk in the urban and spatial planning:
Review of knowledge and practices (Solsona, June 12-13th 2014)

Where focus the attention: WILDFIRE RISK MANAGEMENT APPROACH

Economy /

- **Integrate the positive and negative externalities of all human-made activities related with the increase or decrease (prevention) of fire risk : In order to improve cost-effectiveness of wildfire risk management**
- **Supporting forestry & grazing & croops: as fuel control activities**
- (as example) **Including prevention cost in the price of housing in wildland urban interface (WUI) : Protection houses from forest, or forest from houses?**



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WILDFIRE RISK MANAGEMENT APPROACH

Economy /

Budget in prevention is needed but high suppression budget in the current vulnerable context it is also needed up to vulnerability doesn't change

- **Supporting forestry & grazing & croops: as fuel control activities**

Which are the benefits of rural development related with: ?

1st) wildfire severity reducing (prevention + suppression + restoration costs reducing)

2nd) rural development itself, keeping landscape identity (strong related to welfare of local communities and tourism incomes), biodiversity environmental services conservation, ... Social demands!

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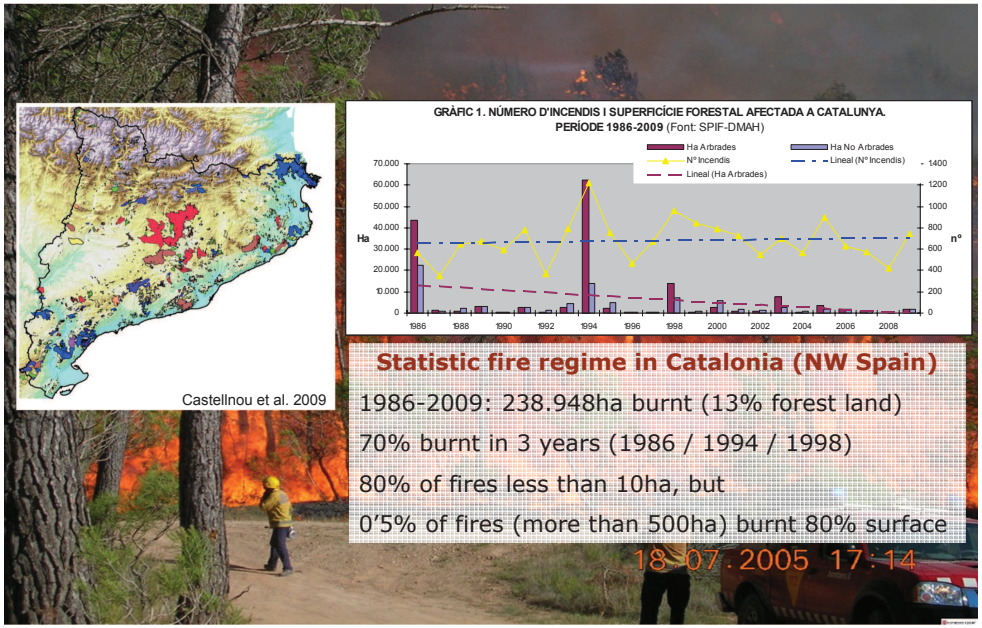

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Some lessons learnt related with wildfire risk management at land-use planning level:

- ✓ ***Fuel accumulation is the main driving force of wildfires (more relevant than ignition causes - ignition risk zero doesn't exist)***
- ✓ ***Suppression capacity has a limit***
- ✓ ***Emergency management has a limit (simultaneously and WUI)***
- ✓ ***Our efficiency in low-intensity fires does us more vulnerable to the high-intensity fires in extreme conditions ("fire paradox")***
- ✓ ***Fire has a behavior pattern***
- ✓ ***Wildfire risk management need a cross-sectoral approach, strong institutional coordination, and social participation***

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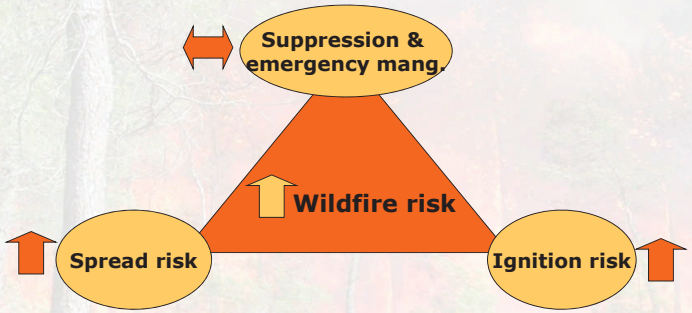
Some lessons learned (and considerations for wildfire risk management at land-use planning level) :



We can not solve wildfires without acting in propagation capacity of the landscape

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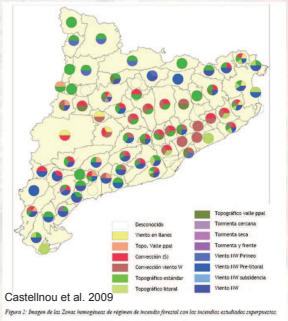
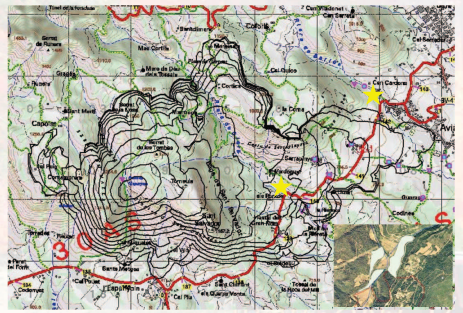
Some lessons learnt related with wildfire risk management at land-use planning level:

- ✓ ***Fire has a behavior pattern***

Knowledge of wildfire propagation patterns or fire typology ⇨ Provide guidelines for a **cost-efficiency** fuel management plan





Some lessons learnt related with wildfire risk management at land-use planning level:

✓ *Fire has a behavior pattern*

Knowledge of wildfire propagation patterns or fire typology ⇨ Provide guidelines for a **cost-efficiency** fuel management plan

↓

SUPPRESSION SYSTEM: Improve efficiency through a pro-active approach to be prepared by future extreme fire behaviour (pre-suppression actions)

FOREST MANAGEMENT : fire ecology species adaptations / productive and or prevention objectives / prescribed burning / incentives!

LAND USE PLANNING: Integration of grazing and agrarian mosaic as prevention infrastructure

SPATIAL PLANNING: To reduce wildland urban interface vulnerability & to increase self-protection capacity

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Some lessons learnt related with wildfire risk management at land-use planning level:

✓ ***1st step) suppression and prevention planning goes together***

✓ ***2nd step) Integrate wildfire risk management into forest and spatial planning in order to reduce landscape vulnerability***

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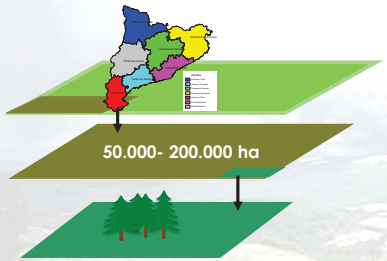
✓ ***2nd step) Integrate wildfire risk management into forest and spatial planning in order to reduce landscape vulnerability***

1.- Including fire behaviour specialist knowledge in the multi-scale hierarchic forest planning model



Regional Forest Plan *(Strategic planning)*

General guidelines of SFM

Hierarchic relation

County Forest Plan *(Tactical planning)*

Regional guidelines of SFM

Hierarchic relation

Forest Unit Plan *(Operational planning)*

➢ **Determination of vocation and preference of forest land use and establishing guidelines for forest planning into de region (including fire risk management)**

FIREfficient: Workshop on Integrating wildfire risk in the urban and spatial planning:
Review of knowledge and practices (Solsona, June 12-13th 2014)

2.- Legal frame and support for that areas where prevention or pro-active fuel management is a priority

Spaces of special forest interest

Strategic forest land for fire risk prevention

In that forest land defined by the PORF *(tactical planning)*, because of its strategic role in spread control of fire or prevention of fire effects, that activities which suppose an additional risk of fire will be forbidden and active measures of forest management to decrease the vulnerability of the forest land will be promoted.

Normative of Forest Policy Plan of Catalonia 2014-2024

✓ *2nd step) Integrate wildfire risk management into forest and spatial planning in order to reduce landscape vulnerability*

3.- Enhancing Forest Plan normative rank in order to strength the linkage between spatial planning and forest one

(in Catalan spatial planning legislation, NFP is recognized as a specific plan with prevalence over low scale spatial and urban planning figures)

- Regional Forest Plan, delegates into the inferior planning figure, the delimitation of ***Strategic forest land for fire risk prevention*** in order to become assimilated by spatial and urban planning (infrastructures, settlements, ..). So that it will be easier its posterior transposition into the urban planning figures according to the own hierarchic position within spatial planning.

FIREfficient: Workshop on Integrating wildfire risk in the urban and spatial planning:
Review of knowledge and practices (Solsona, June 12-13th 2014)

In conclusion…

Without changing spread capacity (fuel accumulation process), current prevention & suppression capacity represents the level of risk that society has to assume

In the Mediterranean, traditional management of forest land builds less vulnerable and more resilience landscape in front of wildfires

Therefore, spatial and land use planning plays a crucial role in the vulnerability and wild fire risk management at landscape level

Mr. Eduard PLANA BACH
Forest Sciences Centre of Catalonia
eduard.plana@ctfc.cat / www.ctfc.cat

Thanks for your attention

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NEW KNOWLEDGE FOR NEW SITUATION.

What Fire Services Need From Spatial Planning?

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Un hecho constante y...emergente!

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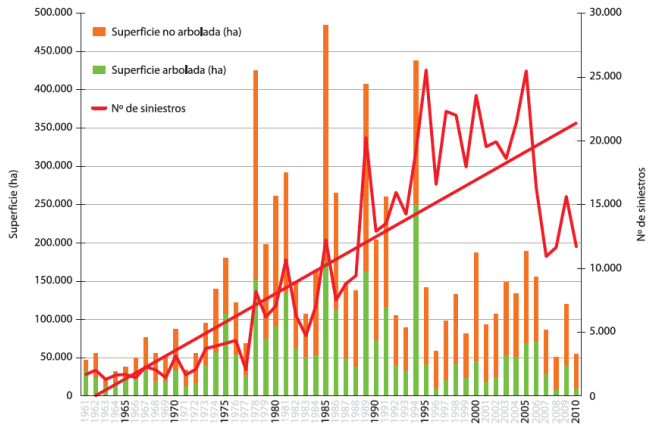
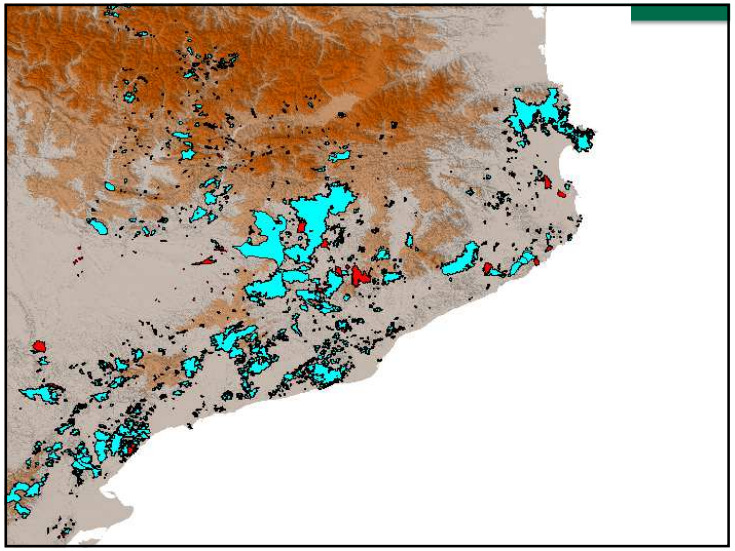
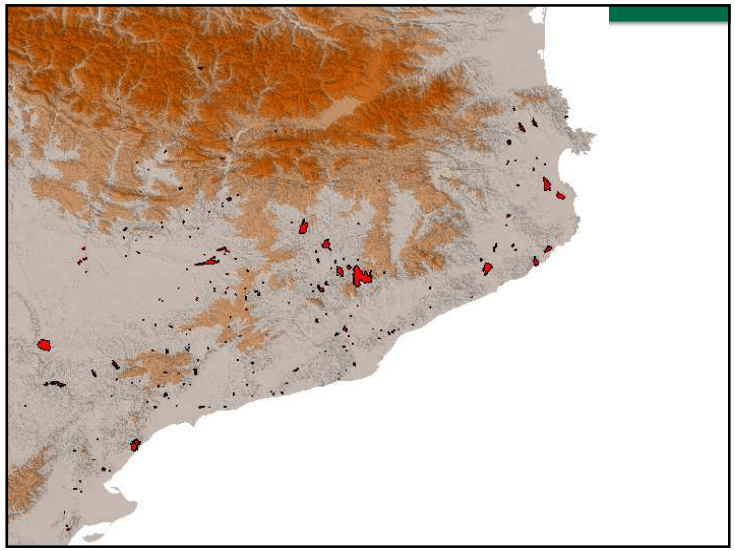
Fuente: MAGRAMA

GRÁFICO 1.1. Evolución del número de siniestros y superficies afectadas, 1961-2010







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GENERACIONES DE INCENDIOS

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Nos ENFRENTAMOS a	La APUESTA es:
1ª Largos perímetros debido a una superfície forestal contínua	Acesibilidad e infraestructuras lineales

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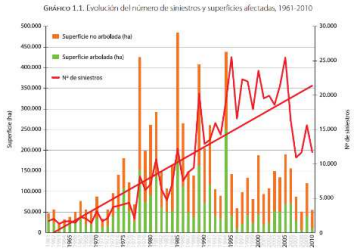
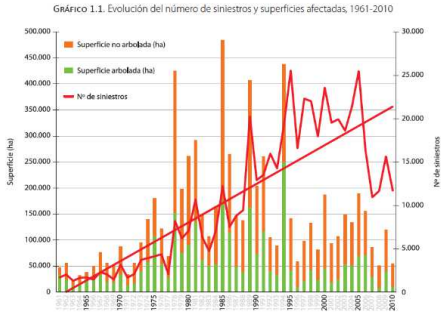
1960

El control de la ignición

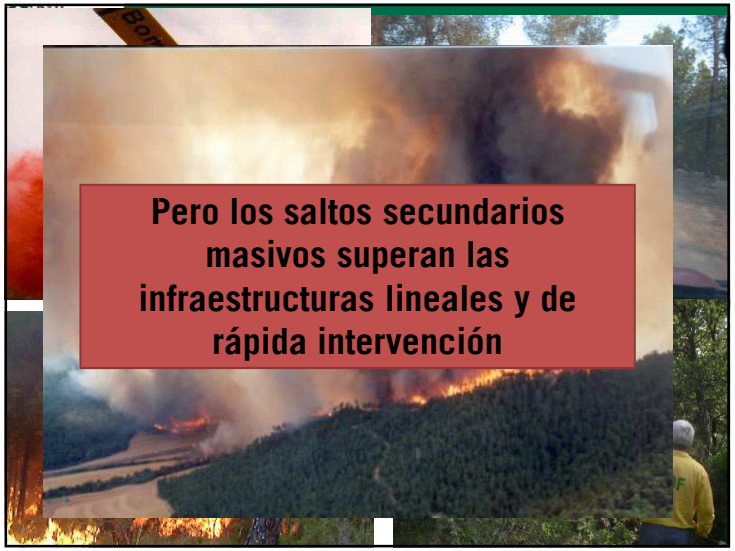


Nos ENFRENTAMOS a	La APUESTA es:
1ª Largos perímetros debido a una superfície forestal contínua	Acesibilidad e infraestructuras lineales
2ª Alta intensidad debido a la acomulación de combustibles	Llegada rápida de recursos, especialmete aereos

1970



El mensaje:
Preservar….
Que no sea un desierto….
Que no quede muerto….



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2ª	Alta intensidad debido a la acomulación de combustibles	Llegada rápida e recursos, especialmete aereos
3ª	Fuegos de copas, con fuegos secundarios masivos	Uso de varias herramientas - agua, fuego, manuales, maquinaria pesada,.., maniobras combinadas-, fomento de la gestión forestal, anticipación, análisis, alta mobilidad, confinamiento

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1ª	Largos perímetros debido a una superfície forestal contínua	Acesibilidad e infraestructuras lineales
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4ª º	Fuegos de copas en zona urbana	Toma de decisiones dinámicas, no jerarquicas, tolerancia al riesgo de la sociedad,

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En la actualidad:

Campañas de sensibilización e información

- **Campaña de sensibilización preventiva a través de los medios de comunicación**

  Este año se cumplen 50 años de acciones preventivas contra los incendios forestales en España. A lo largo de estos 50 años, los españoles han visto en televisión que una gran parte de los incendios forestales se pueden evitar, y que, aunque los medios materiales y humanos son cada vez más cuantiosos recuperar la tierra después de un incendio cuesta muchos años. La conciencia ecológica de los ciudadanos españoles está consolidándose, perc tenemos que seguir colaborando, entre todos, para prevenir los desastres qu provoca el fuego. Durante el mes de agosto se puso en marcha la campaña de concienciación e información a través de medios de comunicación.

- **Campaña escolar**

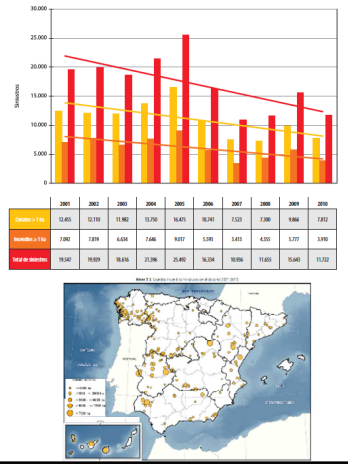
  A través de visitas de monitores especializados, se hace llegar a los alumnos de colegios e institutos de toda España, información para sensibilizarles sobr los problemas medioambientales, sociales y económicos que originan los incendios, sobre sus causas y sobre cómo se pueden evitar.

- **Campaña rural**

  En esta campaña las acciones directas se destinan a la población rural y consisten en representaciones teatrales que intentan sensibilizar a la población sobre las negligencias más habituales. Consisten en representaciones teatrales que de forma itinerante recorren zonas del territorio nacional en las que la incidencia de los incendios forestales por causas agrícolas y ganaderas es significativa. De esta forma se transmite un mensaje sobre la importancia de la acción humana para prevenir los incendios.

Fuente: MAGRAMA 2014.

GRÁFICO 2.1. Evolución del número de siniestros



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STATE OF THE ART

PORQUE NO TENEMOS CAPACIDAD PARA APAGAR TODOS LOS INCENDIOS?

Límite de capacidad de extinción

- Velocidad
- Intensidad

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"I ought to have known. My advisors ought to have known and I ought to have been told and I ought to have asked." Winston Churchill

20

QUE LÍMITES TENEMOS?

Límite tecnológico:

De **VELOCIDAD**

>1,2 Km/h

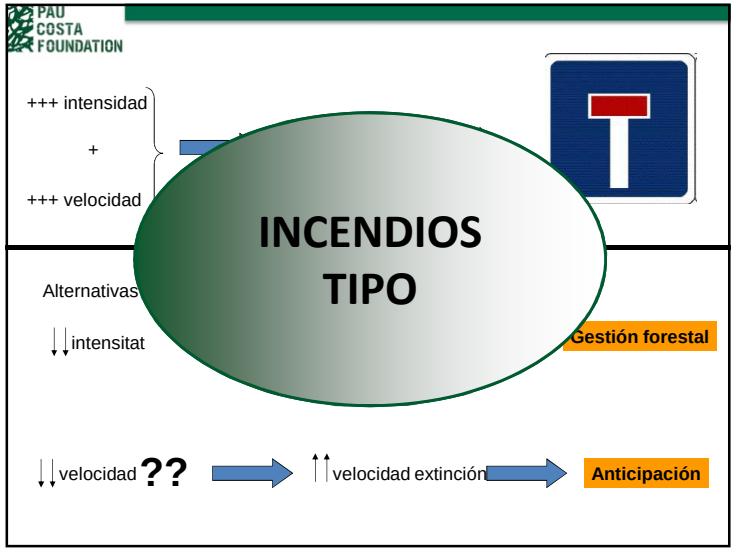
Por **INTENSIDAD**

> 3m

PARADOJA DE LA EXTINCIÓN

Reflexión:

COMO MÁS BUENOS SOMOS APAGANDO LOS INCENDIOS, LOS QUE SE ESCAPAN SON CADA VEZ MÁS VIOLENTOS



INCENDIOS TIPO

INCENDIOS TIPO cómo herramienta PLANIFICACIÓN

Mejora la eficiencia del sistema de extinción

Mejora de la resistencia de los bosques al elemento fuego

Mejora de las infraestructuras de prevención de incendios

Metodología de Trabajo

HERRAMIENTAS PARA LA INTEGRACIÓN DE LOS GIF EN LA GESTIÓN FORESTAL

MAPA DE INCENDIOS TIPO

ZONAS HOMOGÉNEAS DE RÉGIMEN

MAPA DE RIESGO DE INCENDIO TIPO

Basado en Piqué, et al. 2011. *Integració del risc de grans incendis forestals (GIF) en la gestió forestal. Incendis tipus i vulnerabilitat de les estructures forestals al foc de capçades*

IDENTIFICACIÓN DE INCENDIOS TIPO

REGISTRO DE INCENDIOS

PERÍMETRO

FECHA

PATRÓN DE PROPAGACIÓN

SITUACIÓN SINÓPTICA

IDENTIFICACIÓN DE SINGULARIDADES. PATRÓN PROPAGACIÓN / SITUACIONES SINÓPTICAS

INCENDIO TIPO

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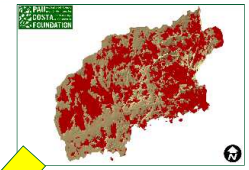
REGISTRO DE INCENDIOS



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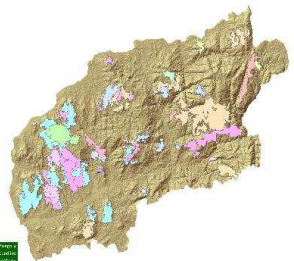


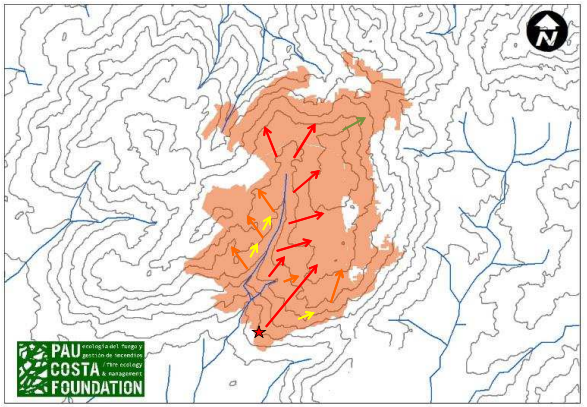
Trabajo de Campo

- Identificación
- Ratificación de perímetros
- Comprobación de propagaciones
- Conocer dinámicas meteorológicas locales
- Rectificación de puntos de inicio y propagaciones.
- Gente local como fuente de datos

IDENTIFICACIÓN DE PATRÓN DE PROPAGACIÓN

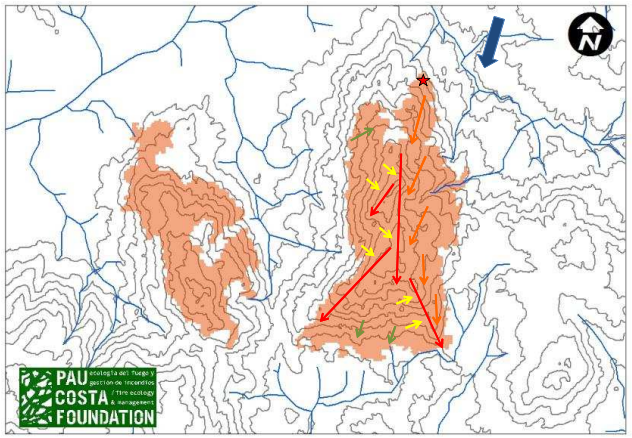
Geraz do Lima 2006.

Patrón de Propagación: Topográfico

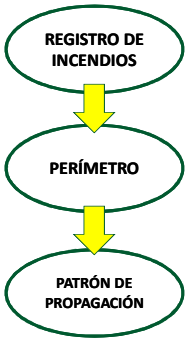


Reberdoes 2005.

Patrón de Propagación: Viento



IDENTIFICACIÓN DE PATRÓN DE PROPAGACIÓN



	PATRÓN DE CONVECCIÓN	PATRÓN DE VIENTO	PATRÓN TOPOGRÁFICO
SUPERFÍCIE AFECTADA	25%	30%	45%

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IDENTIFICACIÓN DE SITUACIONES SINÓPTICAS Y CONDICIONES METEOROLOGICAS EN ALTO MINHO

REGISTRO DE INCENDIOS

FECHA

SITUACIÓN SINÓPTICA

	Codificación
Advección del Este con Baja Térmica	VEBT
Advección Cálida de Sur	CS
Paso de Frente	FRE
Advección del Nord Este	VNE
Advección del Sud Este	VSE

	VEBT	CS	FRE	VNE	VSE
SUPERFÍCIE AFECTADA	75%	13%	7%	5%	1%

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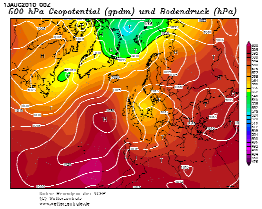
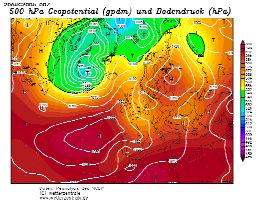
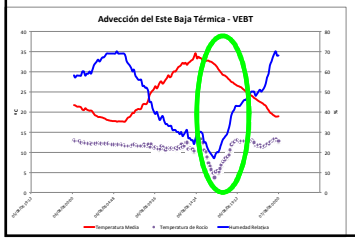
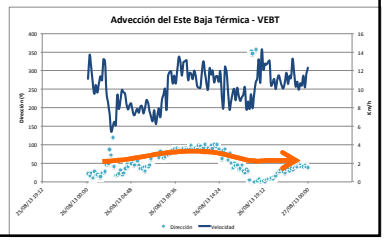
IDENTIFICACIÓN DE SITUACIONES SINÓPTICAS Y CONDICIONES METEOROLOGICAS EN ALTO MINHO









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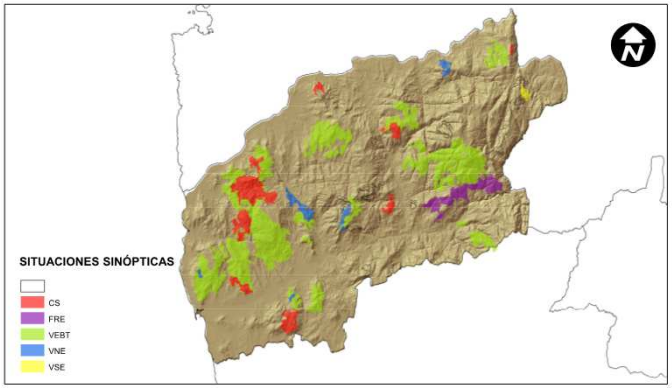


PAU ecología del fuego y gestión de incendios / fire ecology & management COSTA FOUNDATION

TIPIFICACIÓN DE LOS INCENDIOS FORESTALES DE LA REGIÓN DE ALTO MINHO

PAU COSTA FOUNDATION

IDENTIFICACIÓN DE INCENDIOS TIPO

REGISTRO DE INCENDIOS

PERÍMETRO

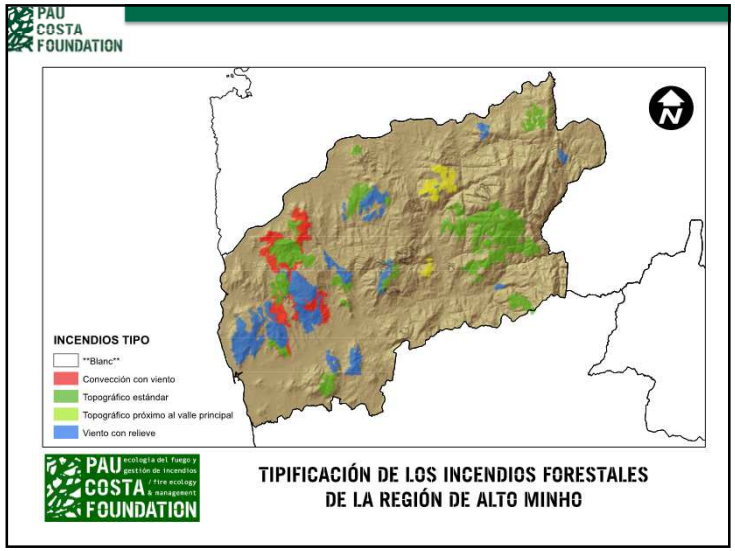
FECHA

PATRÓN DE PROPAGACIÓN

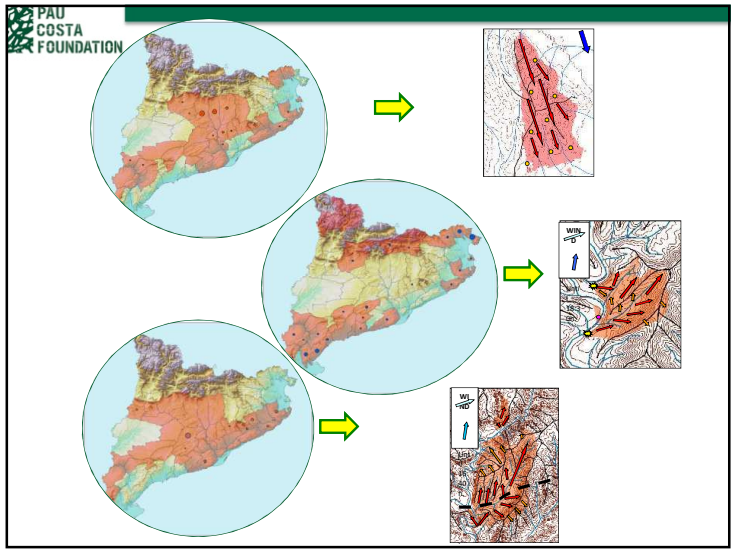
SITUACIÓN SINÓPTICA

IDENTIFICACIÓN DE SINGULARIDADES. PATRÓN PROPAGACIÓN / SITUACIONES SINÓPTICAS

INCENDIO TIPO


PAU COSTA FOUNDATION
INCENDIOS TIPO
"Blanc"
Convección con viento
Topográfico estándar
Topográfico próximo al valle principal
Viento con relieve
PAU COSTA FOUNDATION
TIPIFICACIÓN DE LOS INCENDIOS FORESTALES
DE LA REGIÓN DE ALTO MINHO


PAU COSTA FOUNDATION
NUEVOS RETOS / PRODUCTOS
OUTPUTS
MAPA DE INCENDIOS TIPO
MAPA DE RIESGO DE INCENDIO TIPO
PUNTOS ESTRATÉGICOS DE GESTIÓN
ANÁLISIS DE POTENCIALES


PAU COSTA FOUNDATION


PAU COSTA FOUNDATION
NUEVOS RETOS / PRODUCTOS
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MAPA DE INCENDIOS TIPO
MAPA DE RIESGO DE INCENDIO TIPO
PUNTOS ESTRATÉGICOS DE GESTIÓN
ANÁLISIS DE POTENCIALES

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Identificar oportunidades

Como són? → • **Desgranar patrones**

Dónde estan? → • **Reconstruir incendios históricos**

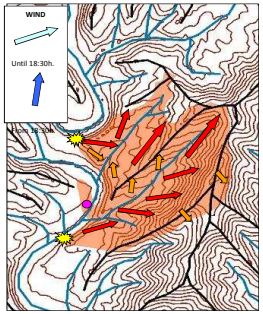
• **Recoger experiencias operativas**

PEG

Punto Estratégico de Gestión

INCENDIOS TIPO

- Topogràfic estàndard
- Topogràfic litoral
- Topogràfic amb succió de vall
- Vent a les planes
- Vent amb relleu
- Vent de subsidència
- Convectiu sense vent
- Convectiu amb vent
- Convectiu amb pirocumul



Oportunidades:

• Cambios de alineación

• Nudos de barranco

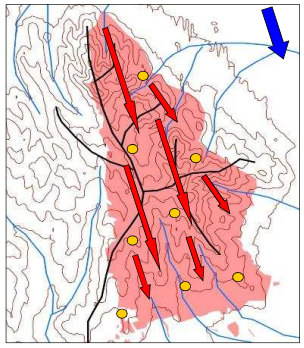
INCENDIS TIPUS

- Topogràfic estàndard
- Topogràfic litoral
- Topogràfic amb succió de vall
- Vent a les planes
- Vent amb relleu
- Vent de subsidència
- Convectiu sense vent
- Convectiu amb vent
- Convectiu amb pirocumul

Oportunidades:

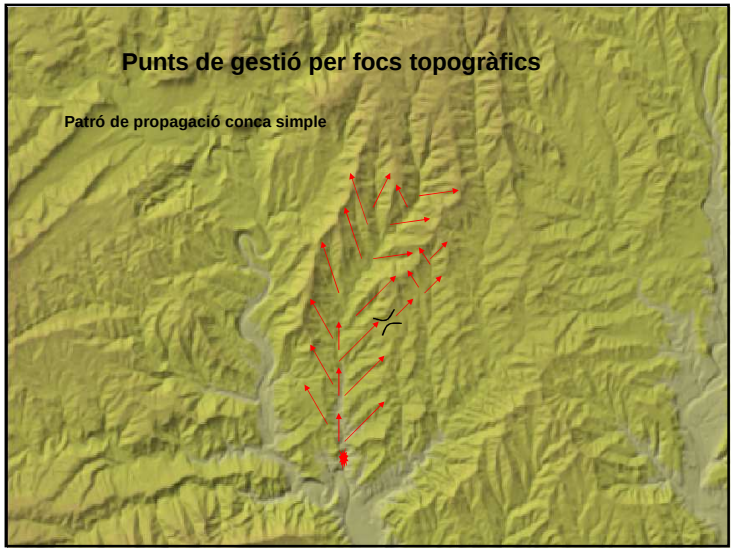
• Nudos de carena

• Contravientos



Punts de gestió per focs topogràfics

Patró de propagació conca simple

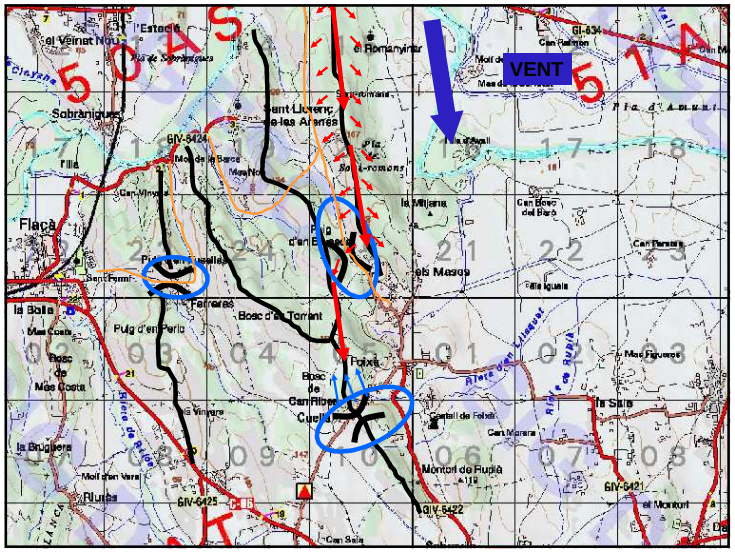


Puntos de gestión por incendios conducidos por viento

VIENTO

Patró de propagación -> Viento en Relive

- Carenes alineades al vent



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PEGs en resumen

MAPA DE INCENDIOS TIPO

PUNTOS ESTRATÉGICOS DE GESTIÓN

Herramienta de **planificación forestal / territorial.**

Adaptación de la gestión forestal al **Incendio Tipo del macizo / territorio.**

Herramienta para dificultar la propagación de los Grandes Incendios Forestales. **NO son infraestructuras de detención ni parcelación de macizos.**

Complementario con la Red Primaria:

- En zonas de matorral.
- En zonas de dominancia de Topográficos Estándar.

A través de modificar la estructura forestal:

- Para mejorar la resistencia del bosque al paso de los incendios forestales.
- Para mejorar las infraestructuras de prevención.
- Crear oportunidades para el sistema de extinción
  - Anticipación
  - Zonas seguras

Escala de trabajo**: Macizo forestal**

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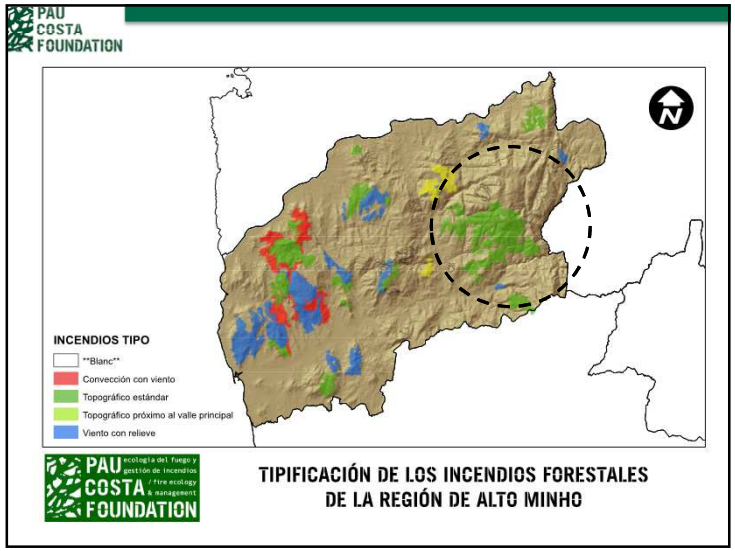
PROPUESTA DE TRABAJO

Identificación PEG's Alto Minho y Parque Nacional Peneda Gerés


PAU COSTA FOUNDATION
INCENDIOS TIPO
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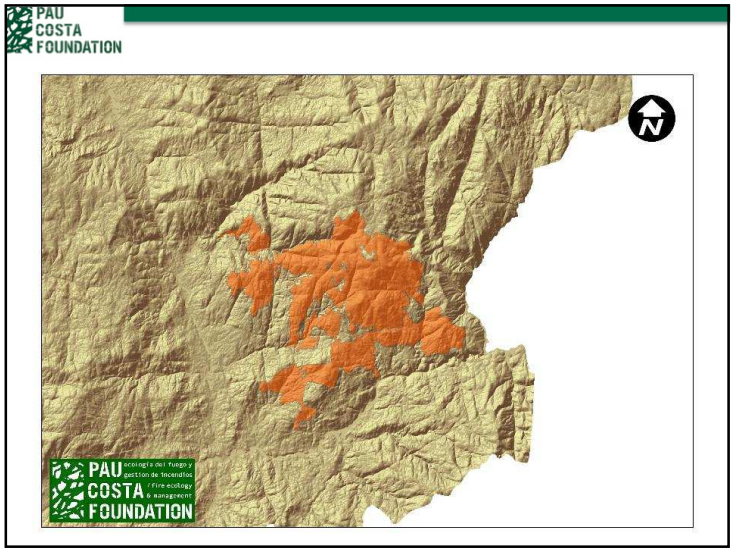
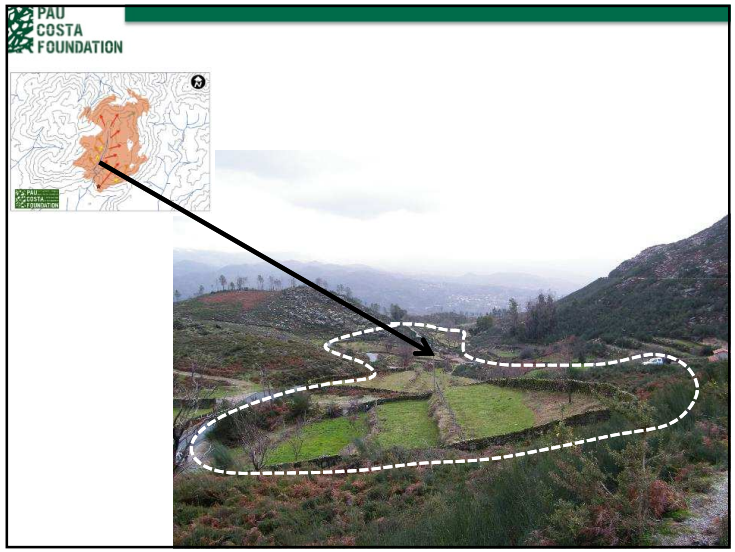

PAU COSTA FOUNDATION


PAU COSTA FOUNDATION


PAU COSTA FOUNDATION

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Identificación PEG's Alto Minho y Parque Nacional Peneda Gerés

Objetivos:

No entender el territorio cómo una unidad individual sino cómo un complejo de matices.

Mejorar eficiencia (**€€€!!)** de la gestión forestal.

De Gestión generalista igual a todo territorio -> Únicamente en puntos clave.

Infraestructuras para Dificultar la Propagación de los Grandes Incendios Forestales

Cambiar el comportamiento de los GIF -> a PIF

Zonas fuera de capacidad de extinción -> Dentro de Capacidad de Extinción

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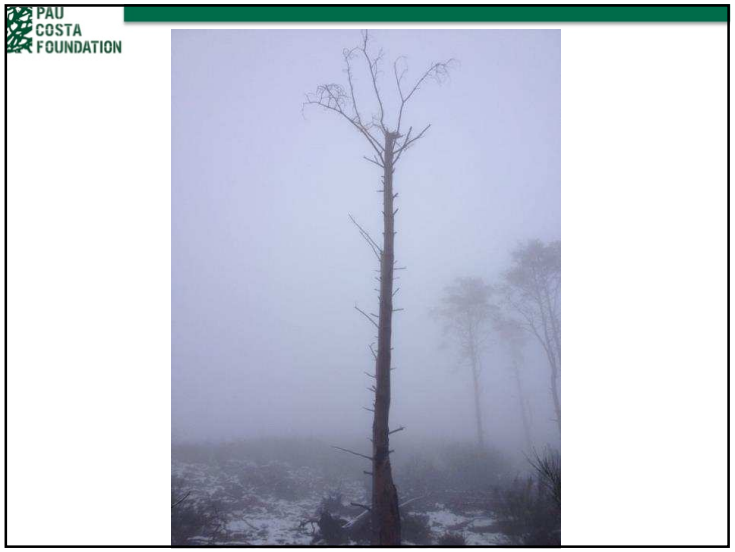
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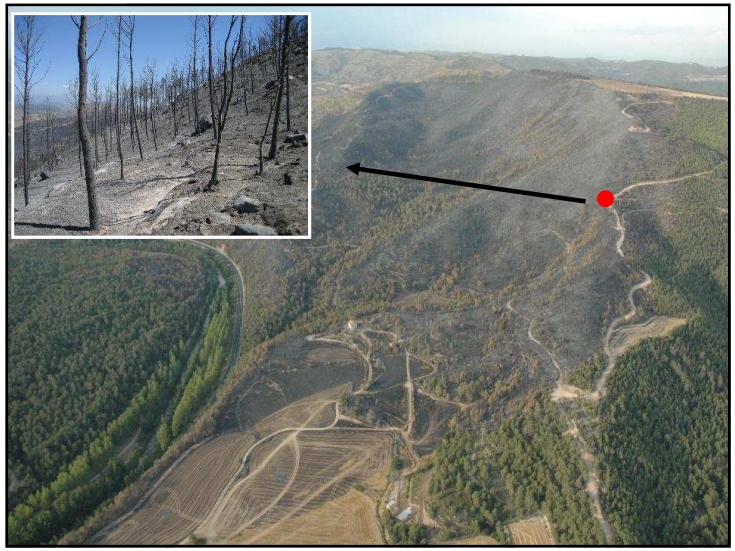


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Solsona, 2014

Operational tools for improving efficiency in wildfire risk reduction in EU landscapes (FIREfficient)

Large forest fire risk assessment and fuel management: operational tools and integrated approach

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Thomas E. L. Smith (King's College London, KCL)

(Solsona, 12 June 2014)

Task 2. Action A2.1.

Name of the action: Review and evaluation of updated knowledge in relation to:

- **Tools to assess extreme forest fire risk at stand and landscape level planning.**
- **Tools for fuel management and fire risk reduction**

Includes:

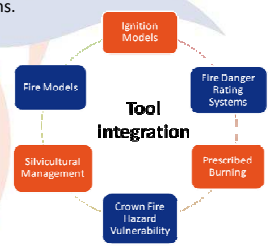
- Review about **ignition modelling** and its potential use in improving existing fire hazard systems.
- Review about **fire behaviour and spread modelling** for identifying landscape fire risk.
- Review about **tools for assessing crown fire potential** from forest structures.
- Review about **forest management guidelines and silvicultural treatments for reducing fire hazard** and provide landscape resistant to large forest fires.
- Review on **prescribed burning as a tool for fuel management** and creation of landscapes more resistant to forest fires.

Expected result: Report reviewing the innovative tools and practices used to assess extreme forest fire spread risk and to reduce fire risk, at stand and landscape level planning.

Objective

The main goal of this **review** is to provide a complete and exhaustive compilation of the **existing fire hazard/risk assessment tools and fuel management tools for fire hazard reduction,** as well as to **describe their real utility** as an input in the decision making process.

Furthermore, the review will **describe the existing and potential links between the different tools**, providing an **integrative view** of the processes and identifying the strengths and weaknesses of their applications.



Index of the report

Index of the report

1. Crown fire hazard assessment tools

Crown fire hazard assessment tools give information on the structural characteristics of the forest stand and its relationship with the vulnerability to generate and maintain high intensity-crown fires. Therefore, **they are useful to assess crown fire potential behaviour and guide forest management to reduce risk of crown fires**.

They should be simple and easy to use by forest and fire managers, so then it is important the development of a classification criterion of the potential crown fire, **based on forest stand variables of easy measurement.**

- Their utility depends on the type of data used to assess crown fire hazard:
  - Crown data
  - Forest stand data
- Link with other tools:
  - Direct relation with fire behaviour models (in both directions)
  - Guide and validate forest management actions

Crown Fire Hazard Vulnerability
Keys for assessing crown fire potential behaviour
Applications: Helps to understand fire behavior to guide silvicultural management
Scale: Stand
Level of planning: Tactical and Strategic (Validate and engine other tools)
Type of strategy: Passive

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Tool	Author	Application
Keys for Appraising Forest Fire Fuels	Fahnestock, 1970	General application, EEUU. Different species. Tactical and strategic
Nomographs for predicting crown fire initiation	Dimitrakopoulos et al., 2007	Mediterranean Greece. *Pinus halepensis.* Tactical and Strategic.
Ladder Fuel Hazard Assessment flow chart (LaFHA)	Menning and Stephens, 2007	Sierra Nevada, California, EEUU. Conifer forests.
Chart for Ranking crown fire hazard (CVFoC)	Piqué et al., 2011	North-East Spain. *Pinus* and *Quercus* forests.
Fuel types and crown fire potential	Álvarez et al., 2012	Girona province, Spain. *Pinus halepensis.*
Canopy fuel classification in relation to crown fire potential	Fernandez-Alonso et al., 2013	Galia Region, Spain. *P. pinaster, P. Radiata, P. Sylvetris*, Mixed pine.

2. Silvicultural treatments and forest management for fuel reduction

Since vegetation is the only factor that can be altered to influence in fire behavior and prevent landscapes from LFF, there is a need of a more widespread **practice of preventive silviculture that modifies forest structures in order to make them more resistant to high intensity fire**.

The most recommended in fire prevention is a "fire-smart silviculture".

Four fuel treatment principles:

- Decrease the accumulation of surface fuels and ladder fuels.
- Raise the canopy base by pruning the trees and remove ladder fuels.
- Thin the stand to decrease foliage density.
- Maintain large trees of fire resistant species.

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- Their utility depends on **the correct application in a right area** and **integration** of the treatments and management guidelines in **land planning.**
- Link with other tools:
  - They can be validated using fire behavior and spread simulators.
  - Their application modifies fire behavior and spread.

Silvicultural Management

Guides and rules to forest management aiming to reduce fire hazard

Applications:
Reports for "user friendly" management

Scale:
Stand and Landscape

Level of planning:
Tactical and Strategic

Type of strategy:
Passive

3. Prescribed burning

Prescribed burning (PB) is the careful **application of fire** under mild weather conditions **to meet a defined management objective being the reduction in fire hazard** the initial motivation of using PB across many areas of the world.

- Their utility depends on the spatial and temporal planning and the capacity of the specialists involved in the PB.
- Link with other tools:
  - Direct relation with forest management, in fact PB it is a forest management tool.
  - Their application modifies fire behavior and spread.
  - They can be validated using fire behavior and spread simulators.

Prescribed Burning

Fire under controlled conditions aiming to reduce fuel load

Applications:
Tool for fuel management
Creation of forests and landscapes more resistant to forests fires

Scale:
Stand and Landscape

Level of planning:
Tactical

Type of strategy:
Passive

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Table 7: Principal tools developed for assessing PB effectiveness, its effects and prescriptions.

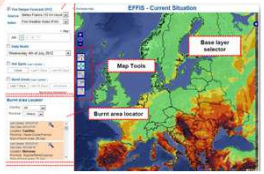
Tool	Tool type	Decision tool for PB	End-user	Scope	Scale	Reference
Firetec	Simulator	Effectiveness Planning	Fire manager Land manager	Worldwide	Landscape	Linn (1997)
BehavePlus	Simulator	Effectiveness Planning Effects	Fire manager Land manager	Worldwide	Stand	Andrews et al. (2003)
Farsite	Simulator	Effectiveness Planning	Fire manager Land manager	Worldwide	Landscape	Finney (2004)
FlamMap	Simulator	Effectiveness Planning	Fire manager Land manager	Worldwide	Landscape	Finney (2006)
FOFEM	Simulator	Effectiveness Effects	Fire manager Land manager Forest manager	USA	Stand	Reinhardt (2003)
FFE-FVS	Simulator	Effectiveness Effects	Fire manager Land manager Forest manager	USA	Stand	Reinhardt and Crookston (2003)
Fuel manager	Simulator	Effectiveness Effects	Fire manager Land manager	Europe	Stand	Krivtsov et al. (2009)
Nomographs	Nomographs	Effectiveness Prescriptions	Fire manager Land manager Forest manager	Conifers from USA	Tree	Reinhardt and Ryan (1988)
Mortality Probability Calculator	Graphs	Effects	Fire manager Land manager Forest manager	*Pinus ponderosa*	Tree	Thies et al. (2008)
Software	Software	Planning	Fire manager	Australia	District	Higgins et al.(2011)
Guideline	Guideline	Prescriptions Monitoring	Fire manager Forest manager	*Pinus ponderosa*	Stand	Kilgore and Curtis (1987)
Guideline	Guideline	Prescriptions Monitoring	Fire manager Forest manager	Southern USA	Stand	Wade et al. (1989)
Expert system	Expert system	Prescriptions	Fire manager	USA	Plot	Reinhardt et al. (1989)
FireTool	Expert system	Prescriptions	Fire manager	Brazilian savannas	Stand	Pivello and Norton (1996)
Handbook	Handbook	Prescriptions	Fire manager	Europe	Stand	Fernandes & Loureiro (2010)
PiroPinus	Excel sheet	Prescriptions	Fire manager	*Pinus pinaster*	Stand	Fernandes et. al (2012)

4. Modeling changes in fuel flammability: Fire Danger Rating Systems

Fire Danger Rating Systems (FDRSs) have a primary objective of assessing fuel and weather conditions, and provide estimates about fuel flammability and the potential fire behavior for every allocation over areas under those conditions.

Some of the most popular systems or models used for this purpose are the Keetch-Byram Drought Index (KBDI), the Canadian Forest Fire Danger Rating / Fire Weather Index (FWI) System), the United States National Fire Danger Rating System (NDFRS), and the Australian Forest Fire Danger Rating / McArthur index

At EU level, the EFFIS system provides the FWI at 10, 16 and 25 km resolution



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- Their utility depends on the temporal framework
  - Daily risk maps
  - Historic analysis vs historic fire regime
  - Future long term evolution (Cchange)
- Link with other tools
  - Provide predictors for fire occurence models
  - Provide weather scenarios for fire spread models
  - Be improved by considering ignition models

Fire Danger Rating Systems

Assessment of fuel conditions according to weather

Examples: FWI, NDFRS, KBDI, FFDI, EFFIS

Applications:
Short term historical wildfire hazard
Short term forecast
Long term assessment: historical and Climate Change Scenarios

Scale:
Regional/global

Level of planning:
Operative and Strategic

Type of strategy:
Active and Passive

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5. Fire ignition modeling

Ignition models have as primary objective to understand the temporal and spatial patterns of fire initiation.

There is a large variation of models depending the ignition data used (fire size, cause) spatial scale of analysis (proximity vs administrative/ecological aggregations)

No clear distinction between fire ignition models and fire occurrence models:

– Ignitions should focus on initiation point and cause
– Fire models have an important area component (fire spread conditions gain importance)

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Table 1: Studies dealing with ignitions of Natural or Any cause (aggregated)

Autor	Year	Journal	Place	Study period	Cause
Catry et al.	2010	*Int Wildland Fire*	Portugal	2001-2005	all
Maingi and Henry	2007	*International Journal of Wildland Fire*	USA	1985-2002	all
Vázquez de la Cueva et al.	2006	*International Journal of Wildland Fire*	Spain	1974-2000	all
Yang et al.	2006	*Knowledge-Based Systems*	United Kingdom	1998	all
Flannigan et al.	2005	*Mitigation and adaptation strategies for global change*	Siberia, Canada and Alaska	1980-1999	all
De la Riva et al.	2004	*Remote sensing of Environment*	Spain	1983-2001	all
Preisler et al.	2004	*Int J Wildland Fire*	USA	1970-2000	all
Badia et al.	2002	*Environmental Hazards*	Catalonia	1983-1999	all
Cardille et al.	2001	*Ecol Appl*	USA	1985-1995	all
Donnegan et al.	2001	*Can J For Res*	USA	1748, 1851, 1871	all
Sturtevant et al.	2003	*Proc 2nd Int Wildland Fire Ecol and Fire Manag*	USA	1985-2000	all forest fires
Chuvieco et al.	2010	*Ecological Modelling*	Spain	1960-2004//2002-2004	human and lightning
Amiantulli et al.	2007	*Ecol Model*	Aragon	1983-2001	human, lightning
Vazquez and Moreno	1998	*Int J Wildland Fire*	Spain	1974-1994	lightning and human
Larjavaara et al.	2005	*Forest Ecology and Management*	Finland	1985-1992 // 1996-2001	lightning
Larjavaara et al.	2005	*Agricultural and Forest Meteorology*	Finland	1996-2002	lightning
Wotton and Martell	2005	*Can J For Res*	Canada	1991-2001	lightning
Podur et al.	2003	*Ecol Model*	Canada	1976-1998	lightning
Diaz-Avalos et al.	2001	*Can J For Res*	USA	1986-1993	lightning
Rorig and Ferguson	1999	*Journal of applied meteorology*	USA	1948-1977	lightning
Gisborne	1926	*Monthly Weather Review*	USA	1924-1925	lightning
Larjavaara et al	2004	*Silva Fennica*	Finland	1961-1997	natural

Table 2: Studies dealing with ignitions of human causes (aggregated) or specific causes (divided)

Autor	Year	Journal	Place	Study period	Cause
González-Olabarria et al.	2011	*Annals of Forest Science*	Catalonia	1994-2007	human
Martínez et al.	2009	*J Environ Manage*	Spain	1988-2000	human
Romero-Calcerrada et al.	2008	*Landscape ecology*	Spain	2000-2005	human
Loboda and Csizar et al.	2007	*Ecological Applications*	Russian Far east	2001-2004	human
Syphard et al.	2007	*Ecol Appl*	California	1960-2000	human
Vega Garcia	2007	*Wild-fire 2007*	Cataluña	1996-2000	human
Badia-Perpinya and Pallares-Barbera	2006	*Int J Wildland Fire*	Catalonia	1987-1998	human
Guyette et al.	2002	*Ecosystems*	Missouri	1700-1850	human
Pew and Larsen	2001	*For Ecol Manage*	Canada - Vancouver	1950-1992	human
Vega Garcia et al.	1999	*Invest Agr: Sist Recur For*	Canada	1986-1990	human
Vega Garcia et al.	1995	*Int J Wildland Fire*	Canada	1986-1990	human
Vázquez and Moreno	1993	*Landscape and Urban planning*	Spain	1974-1988	pasture burning, lightning, arsonist, unknow and negligence
Prestemon and Butry	2005	*Am J Agr Econ*	Florida	1995-2001	arson
Prestemon et al.	2002	*Forest science*	Florida	1982-1999	arson, lightning, accident
Yang et al.	2007	*Forest Science*	USA	1970-2002	arson, lightning, others
Vasconcelos et al.	2001	*Photogramm Eng Rem S*	Portugal	1992-1995	arson, negligence, pooled causes
González-Olabarria et al.	2012	*International Journal of Wildland Fire*	Catalonia	1995-2006	All; split by causes
Wotton et al.	2003	*Climatic change*	Canada	1976-1999	Human; aggregated on 2 subgroups
Grala et al.	2010	*Int J Wildland Fire*	USA	1991-2005	All; split by causes
González-Olabarria et al.	2014	*Rev. Risk analysis*	Catalonia	1995-2008	All; split by causes
Ganteaume et al.	2013	*Environmental Management*	Mediterranean Europe	2006-2010 // 1995 - 2010	All; split by cause
Genton et al.	2006	*Int J Wildland Fire*	Florida	1981-2001	lightning, arson, accident, railroad

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- Their potential utility (by temselves) is overated
  - Mainly improve knowledge
- Link with other tools (enhance utility)
  - Together with fire size and fire danger ratings improve daily and long term risk assesments
  - Define fire regime that can be included on some fire spread simulators (multi-event ones)
  - If specific casuistic is considered, some preventive policies can be developed and implemented

Ignition Models

Assessment of ignition presence hazard

Applications:
Identify risky areas
Mid-long term assessments

Scale:
Landscape and Regional/global

Level of planning:
Operative and Strategic

Type of strategy:
Active and Passive

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6. Fire behavior/spread models

Fire behavior models are used to understand fire related variables according to fuel types, fuel distribution, and surrounding conditions.

Fire spread models (with a fire behavior model as engine), simulate fire evolution, on time and space, or only on space (if design to simulate multiple fire events, and generate risk maps).

There is a great variation depending on spatial and temporal working scales, defining it potential utility.

They are the middle link in between the other tools for fire hazard/risk assessment, and can be feed from tools like ignition models, fire danger systems.

They can validate (on a computer) prevention measures as forest management rules, prescribed burning etc.

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FIREfficient

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Fire Behaviour Models

Simulates fire behavior without including the spatial component explicitly.

Examples: Behave Plus, Nexus, Fofem

Applications:
Assessment of stand level fire behaviour

Scale:
Stand

Level of planning:
Tactical and Strategic (Validate and engine other tools)

Type of strategy:
Passive

"Stand" being an area with homogeneous fire behaviour (fuel conditions, topography, weather..)

Require from deep understanding to exploit their potential as DSS

Not always achieve, trend to use the one the user is more comfortable with

Fire Spread Models. 1. Single fire event

Spatially Explicit Fire Spread Simulators

Examples: FarSite

Applications:
Allow knowing the evolution of potential fires

Scale:
Stand and Landscape

Level of planning:
Operative and Tactical

Type of strategy:
Active and Passive

Fire Spread Models. 2. Multiple fire events

Spatially Explicit Fire Spread Simulators

Examples: FlamMap, FSPro, MedFire

Applications:
Allow to understand the factors affecting fire risk at large scales in long term periods.

Scale:
Landscape and Regional/global

Level of planning:
Tactical and Strategic

Type of strategy:
Active and Passive

FIREfficient

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An integrated view

Understand the assestment tools,

Their real potential (don't get short, don't go to far),

Improve them, by generating sound links between them,

Should provide a strong steping stone for suporting decision making

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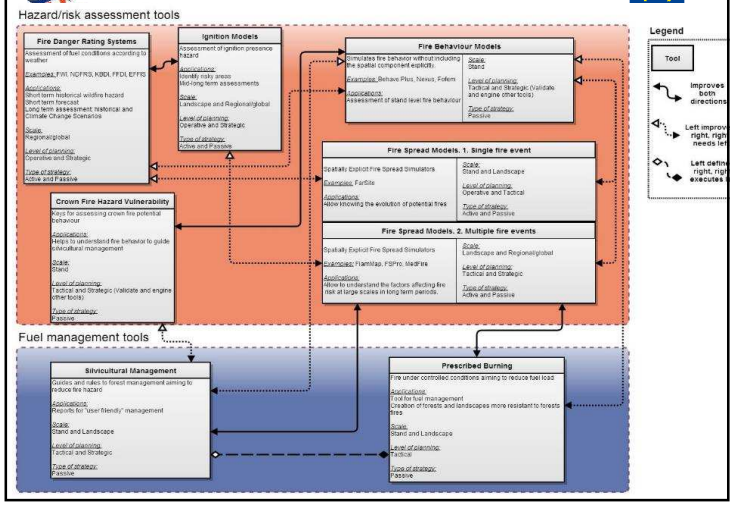
FIREfficient



This project is co-funded by the European Union

Thank you

, Marc Castellnou, Alexander Held,, Daniel Kraus

Integrating Risk in Planning and Management

Obstacles and Hindrances

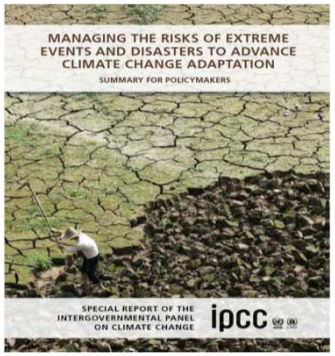
Content

- SREX Report applicable to forestry, landscape
- Awareness vs Action
- Hindrances
  - Economic Hindrances
  - Environmental Hindrances
  - Information Hindrances
  - Attitude and Behaviour (psychological coponent)
  - Political Hindrances
- Summary

IPCC 5

SREX Report

Risik-Management



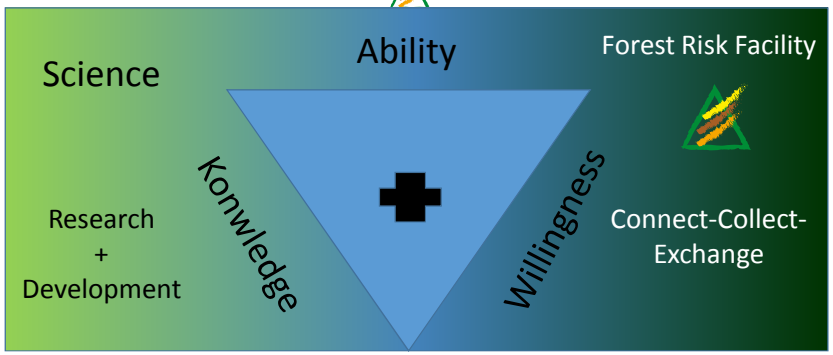
Key message:
Central Position in Risk Management in the future is **Adaptation** and **Mitigation**

Enough Knowledge,
Lack of implemenation and applied knowledge

SREX report looking into causes, obstacles and hindrances

SREX findings applicable to Forestry and Landscape Management

From Knowledge to Action



ACTION !!!

Don Adaption and the windmills of hindrance

Political

Economic

Information

Environment

Don Adaptation

Psychology

Economic Hindrances — Liquidity

Adaption often means high investment, but....

1

Savings / Profits come in
- later
- Long term
- In small installments or portions

Decision Makers (Politicians) oftenf ocus on short term goals (voluntarilly or forced)

Economic Hindrance — deficits in knowledge

Monetary Level

Risik.avoidance-

Costs ⟷ Amount € ? ⟷ Effects

basic knowledge of priciples of Forest Economy is often very low with forest managers (on avaerage)

Low ability and use of correct calculations for alternative decisions (Dynamic Investment Calculation)

Multicriteria level

To-Date no real use of multi-crieteria options evaluation
→ Search for Low-Regret or No-Regret Measures

2

Environment — dynamic growth vs adaption goal

Actual Processes determined by actual climate (known)

3

Risk level determined by future climate (unknown)

Forests are long term production

actual tree species composition

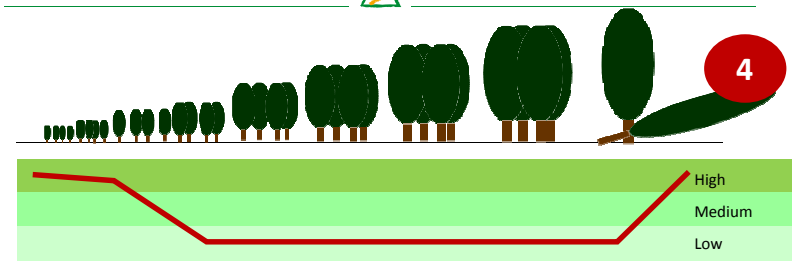
not adapted in future?

Temporraily work „against“ nature? Uncertainty as excuse.

Environment

long-term production (longevity)

4



Influnecing Opportunities

- Adaption Measures (Baumartenwahl, Pflegetree species, silviculture) often in early forest stages
- Major proportion of stands has marginal adaption potential
- High Risk of missing the phase of best influence and best effect

Information

variing level of knowledge and uncertainty

Knowledge of relevant facts different in terms of Agreement and level of certainty

5

Variety of knowledge levels presumed as general uncertainty

Missing lik to consequences of decisions

Uncertainty excuse for doing nothing

		Consequences of wrong decision	
		low	high
Agreement and Level of certainty	high	++	++
	low	+	-

Information

limited use

Natural Disturbance
→ use of Information only after incident

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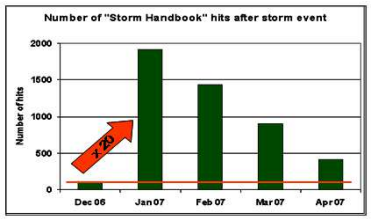
→Often only partially in „easy access“ format and often not „implementing friendly“ presented

No disturbance
→No use of information
→No application of knowledge



Use of “knowledge”, no assistance how to apply , needs complementary actions (phone, personal)

Information

„aging“ of knowledge

Change

Knowledge

7

Change faster than knowledge

Available knowledge then of lower relevance

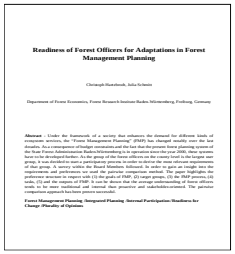
Often with technical measures

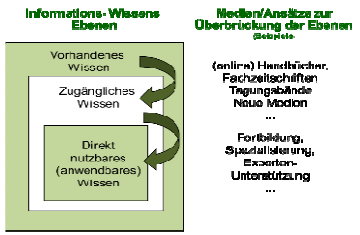
Foresrty related problems with building knowledge
lack of interest in respective training
high value of traditional knowledge with forest owners

Information — Quality of Information presentation

8

Knowledge in non-applicale format
→ Scientific Publictaions


Readiness of Forest Officers for Adaptations in Forest Management Planning



Information — technical availability

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Technical availability in crisis situation too limited

Written format availaility ok in forestry via Internet

→In crisis situation need for additional „care“: phone, personal support, and assistance by incident management teams

→ Train the trainers
→ FRISK GO Projet
→ National contact and cooridnation

Information — Space and Time

Too often– too seldom

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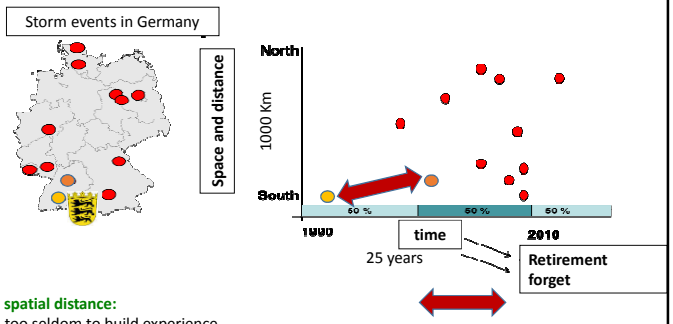
1990 (150 %)
Ca. 15 Mio. m³

1999/2000 (300 %)
Ca. 30 Mio. m³



Combination of time and spatial distance:
Disturbance on local level too seldom to build experience
→ Missing personal knowledge

Psycho-Social

Psychosocial Hindrances neglected too often

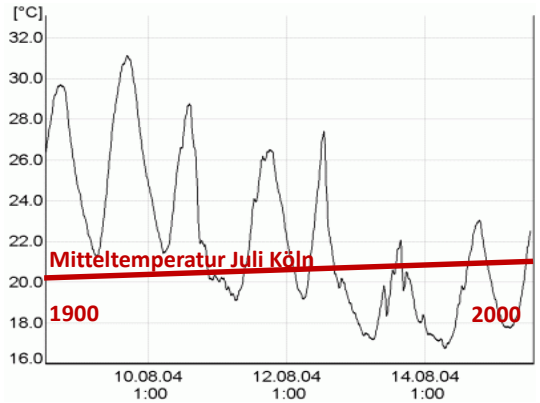
Needs more attention

Overview and understanding of psycho-social hindrances essential to explain not-rational bevaviour

Hemmnis	Veranstaltung Nr.		
	1	2	...
1	√	√	
2			√
3	√		
4		√	
5	√		
6	√		√
7		√	
8	√		√
9		√	
10	√		√
11		√	
12	√		
13	√	√	√
14	√		√
15		√	
...			

Psychosocial — Visibility of problem

Daily Temperature in Köln



- Daily you can feel
- Long term you can not feel,
- no active direct exposure

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Psychosocial — Lighthouse incidents too seldom

Negative events with signal charackter lead to action

Short term „no direct effects“ events lead not to action (you get away with doing nothing)

Climate Change has no direct impulse for action

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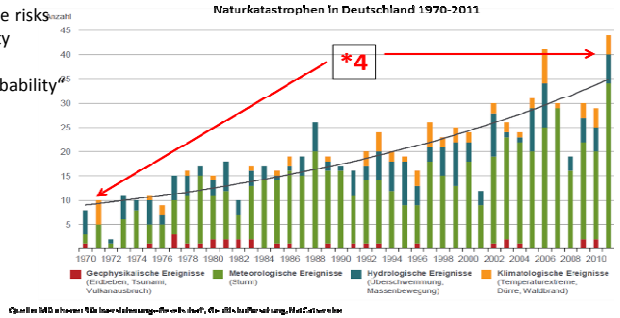
Psychosocial — tendency to underestimate

Tendency to underestimate risks with high natural variability

→psychology of „low probability“



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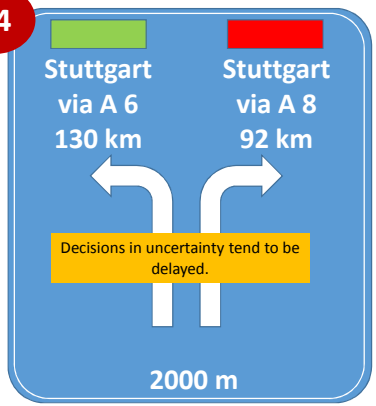
Psychosocial — slow decision under uncertainty

14



You have a job interview in Stuttgart.
Time is short already.
You are passing this sign when the radio says:

Slow traffic on A 8 over 2 km

What do you do?

What do you do with the following message?

Road closure on A 8 estimated delay minimum 3h

Psychosocial — time delay

Effects of adaptation measures or the effects of no-measures often only visibsle in 10, 20 or more years, high time delay

Short term no or very limited effects on forest systems

Negative consequences only partially visible in next 20 years

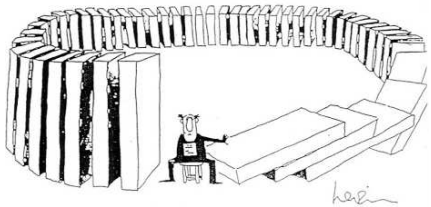


Abb. 1: Zeitliche Trennung von Ursache und Wirkung
Quelle: New Yorker Magazine 1976

15

Psychosocial — missing visibility of effectiveness of measures

16

missing immediate result of adaptation measures

Total avoidance of disturbance impossible (minimised impact hard to explain)

Success only in reduced impact

Low visibility compared to direct response actions

Psychosocial — Creeping Normalcy

17

Creeping Normalcy = CEP creeping environmental problem only visible after tipping point

Creeping chnages have low visibility

New, but changed, current state is „normal“

Action only after impact

Psychosocial — Creeping Normalcy

Psychosoziale Hemmnisse – Creeping Normalcy

Political – the good Samaritan

Strong public support and subsidies after diaster events for forest owners

→Expectancy of support after disturbance events
→Low own intrinsic motivation for prevention, mitigation or preparedness

18

Political – time delay of result and elections

19

Crisis response → Political visibility

Prevention, mitigation, adaptation
No visibility

→costs for mitigation and adaptation
„not in my political term“

Political – conflict of objectives

20

risk management objectives can be contradicting other objectives

Tree species:
Adapted alien vs natural regeneration

Short rotation vs old growth elements

„cheap“ natural regenration of i.e. Norway spruce versus diversifictaion of tree species

Political

Dis-information

Adaption strategies have effects on several business and interest fields

Avoidance or postponment of adation measures can be highly profitable in the short term

21

Lobby groups work with targeted dis-information to avid political pressure

Effective mechanism that adresses the psychosocial hindrances and potentially increases the hindrances

Summary

A good number of „good reasons“ to do nothing

Coincidence with tendency to avaid change

Intrinsic motivation for actio is unlikely

Active and rational decisions needed for pro-active action

Integration of risk management in normal business and management:
•Risks to become decision criteria in standard forest management

→Strengthening of thinking „risk“ in forest inventory
→ risk adaptation integrated in daily business not preceived as additional burden

→ building capacity needs time, unavoidable

Thank you for listening

Northumberland National Park Authority

FIREfficient

Operational tools for improving efficiency in wildfire risk reduction in EU landscapes

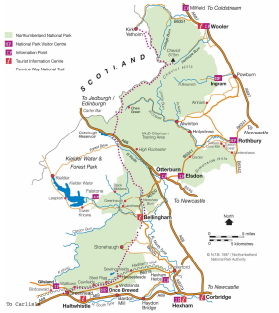
Andrew Miller
Head of Programmes and Conservation
Northumberland National Park UK

Northumberland National Park Authority

UK Landscapes

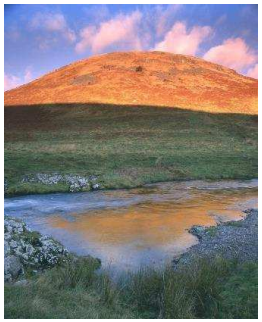
Northumberland National Park Authority

Northumberland National Park



Northumberland National Park Authority

Key Characteristics



- Highest Hills
- Most remote
- Least populated
- Settlements on the edge

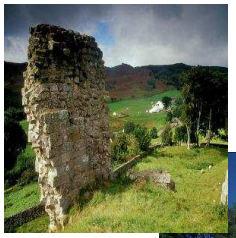
Northumberland National Park Authority

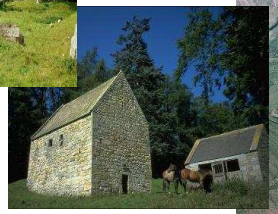
A Natural Environment?

www.northumberland-national-park.org.uk

Northumberland National Park Authority

A man made landscape!





www.northumberland-national-park.org.uk

Northumberland National Park Authority

Farming & Land Management

www.northumberland-national-park.org.uk

Northumberland National Park Authority

Sporting and Public Access

www.northumberland-national-park.org.uk

Northumberland National Park Authority

Burning as a Tool

www.northumberland-national-park.org.uk

Northumberland National Park Authority

Wildfire!

www.northumberland-national-park.org.uk

Northumberland National Park Authority

Traditional response!

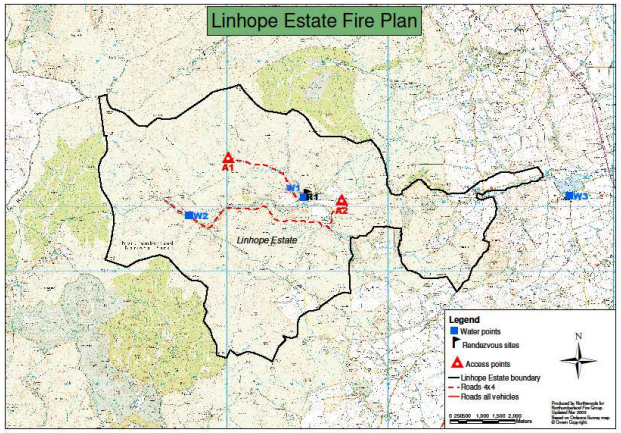
www.northumberland-national-park.org.uk

Northumberland National Park Authority

Partnership approach

www.northumberland-national-park.org.uk

Linhope Estate Fire Plan



Fire Group

Northumberland Fire Group

Temporary Notice

EXTREME FIRE RISK

Due to a recent spell of dry weather please be advised that there is an extreme risk of fire

Please take care!

In the event of an emergency please dial 999

For information on the Northumberland Fire Group, visit:

The Future?

- Partnerships
- Risk Management
- Prevention
- Preparedness
- Communication
- Innovation
- Knowledge Capture
- Sharing Good Practice

Thank You

Developing a risk assessment approach for forest fire at the rural-urban interface:
potential of the Wildfire Threat Analysis (WTA) framework

Aleksandra Kazmierczak, Julia McMorrow, Jonathan Aylen
University of Manchester
Rob Gazzard
Forestry Commission England
James Morison, Andy Moffat
Forest Research

Scoping study

- **Need**: FCE need to manage wildfire threat to forest assets and surrounding communities
- **Aim**: to test the applicability of Wildfire Threat Analysis (WTA), a framework applied successfully in New Zealand
- WTA sees wildfire threat as a combination of three GIS modules, each made up of GIS layers

Questions addressed:

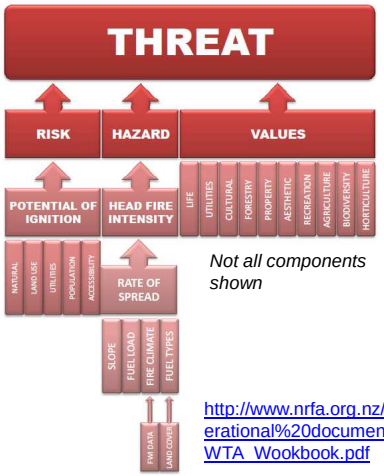
1. How well does WTA fit with existing UK risk frameworks?
2. Can WTA can be translated into practice as a pilot GIS tool for FCE, considering data availability and sources of uncertainty?

New Zealand's Wildfire Threat Analysis (WTA)

RISK of ignition: probability of a fire starting - ignition from various sources.

HAZARD of fire intensity and spread, potential fire behaviour

VALUES at risk: assets that are threatened by wildfire and should be protected

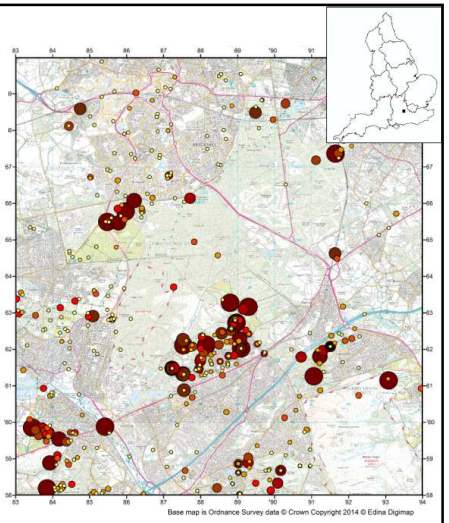


Not all components shown

http://www.nrfa.org.nz/Operational%20documents/WTA_Wookbook.pdf

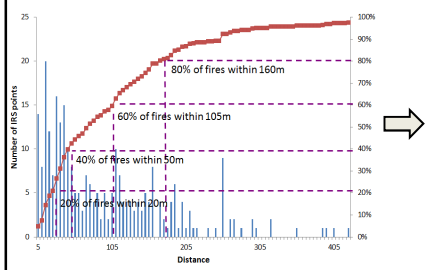
Case study area

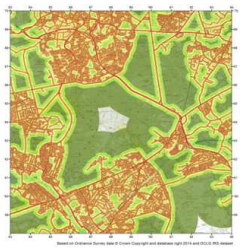
964 attended fires 2009-13; Fire Services' Incident Recording System (IRS)



Analysis of spatial distribution of IRS points

Fires occur in close proximity to built-up areas, roads and footpaths





Uncertainty about the point location; the type of vegetation on fire; the number of fires unrecorded -> need for expert judgement

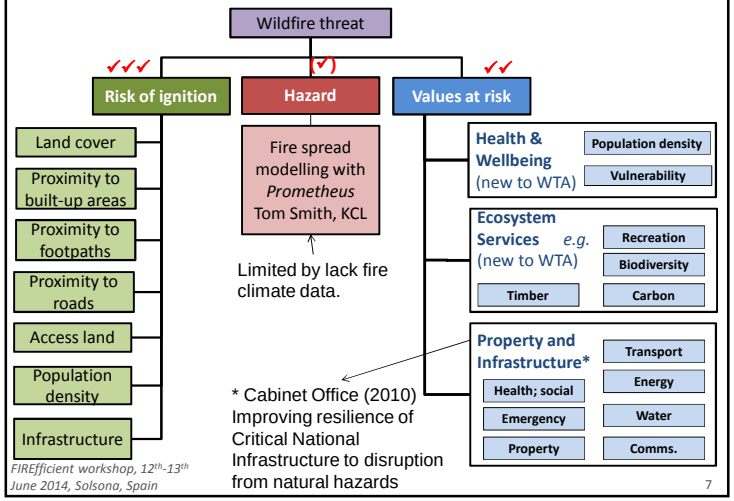
WTA methods

For each module, multi-criteria evaluation was used to combine GIS layers (criteria), guided by expert knowledge from 2 workshops and meetings with individuals:

1st workshop / 2nd workshop / Meetings

1. **Select** — **Which GIS layers (criteria, factors) to include**
   Sourcing data (90+ layers); understanding data limitations.
2. **Score** — **Capture how layers vary spatially**
   e.g. risk of ignition score of each land cover type
3. **Weight** — **Relative importance of factors**
   Expert knowledge to weight layers before combining
4. **Map** — **How to represent results**
   Number of classes, etc
5. **Evaluate** — **Accuracy of the results**

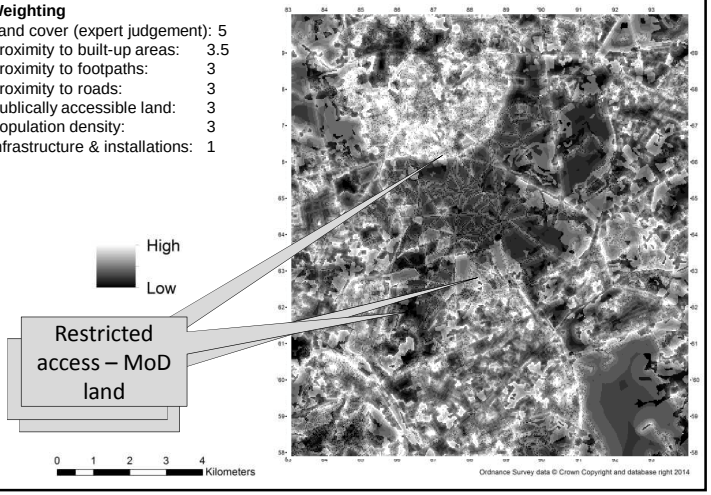
Modified Wildfire Threat Framework



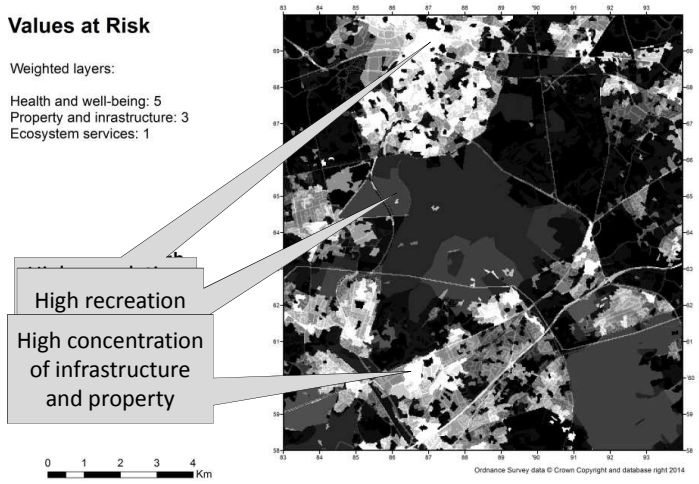
Outputs: Risk of Ignition map

Weighting

Land cover (expert judgement):	5
Proximity to built-up areas:	3.5
Proximity to footpaths:	3
Proximity to roads:	3
Publically accessible land:	3
Population density:	3
Infrastructure & installations:	1



Outputs: Values at Risk map



Potential applications of WTA

- Raising the profile of wildfires and increasing awareness of the threat
  - *"…to support the position of fires on the Community Risk Register"*
  - *"…to inform the land owners how their land affects the impact in the adjacent area"*
  - *"awareness raising in the community"*
- A starting point for more detailed consideration by local stakeholders
  - *"a tool for getting people around the table, generating discussion…"*

Potential applications of WTA cont.

- **Risk of Ignition map: targeting prevention**
  - Local authority: *"… it provides useful information relative to development control. Similarly to flood risk maps, this map would be of benefit to planners"*
  - Fire and Rescue Service: *" …to inform F&RS Integrated Risk Management Plan"*
    - an assessment of all risks to the community, resulting in a long-term plan to make the Fire and Rescue Service more responsive to locally identified needs, done by every fire authority in the country
  - Land owners and managers:
    - *"helps to identify where to fireproof the landscape"*
    - *"helps to identify the areas where we should be seen"*

Potential applications of WTA cont.

- **Values at Risk map: land management and F&RS response**
  - *"…helps to highlight the fact that fire management on FC land is necessary not only to protect the FC's assets, but also to prevent the spread to neighbouring areas and the damage that can be caused to other property and infrastructure"*

- *"useful for a commander in the case of an incident to decide where to allocate resources"*

Potential problems with WTA application

- **Absence of national regulatory framework** enforcing consideration of wildfires in development control, despite fires featuring on National Risk Register
- **Very time-consuming exercise** – data collection from multiple sources; data availability and quality
- *"The **maps are difficult to understand** without having gone through the stages"*
- Highly variable **stakeholders' views** on the importance of different factors
- The **maps should be reviewed** periodically (5-10 years) to consider changes in land cover and ongoing development

Next steps

Follow-on research to refine and test transferability

- Develop hazard module, e.g. incorporate fire weather data.
- Extend values at risk, especially other ecosystem services layers
- NZ's WTA was national scale, ours was local, so need to test transferability to other areas of UK and upscaling
- Potential for more objective statistical modelling of RoI at a national scale, despite the IRS data limitations.

The University of Manchester

NERC SCIENCE OF THE ENVIRONMENT

Forest Research

Forestry Commission England

On behalf of the team…

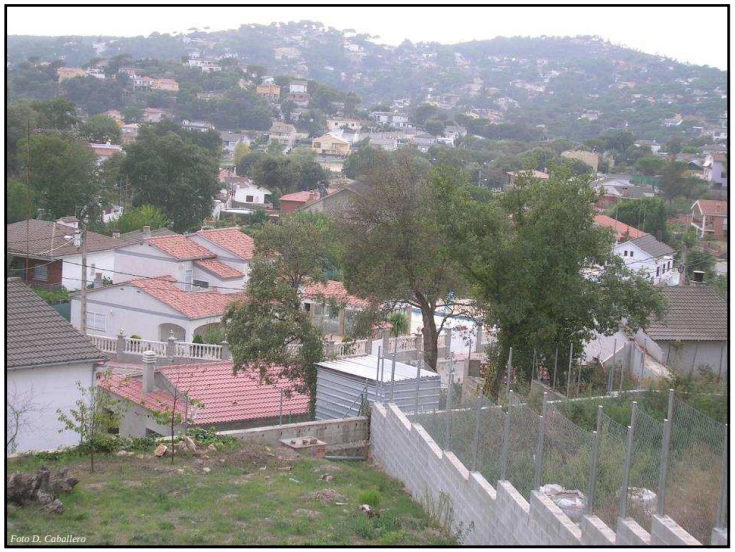
Thank you

Wildland-Urban Interface: Implementation of forest fire risk into the urban planning process

Some tools and approaches applied in Spain

David Caballero - MeteoGRID

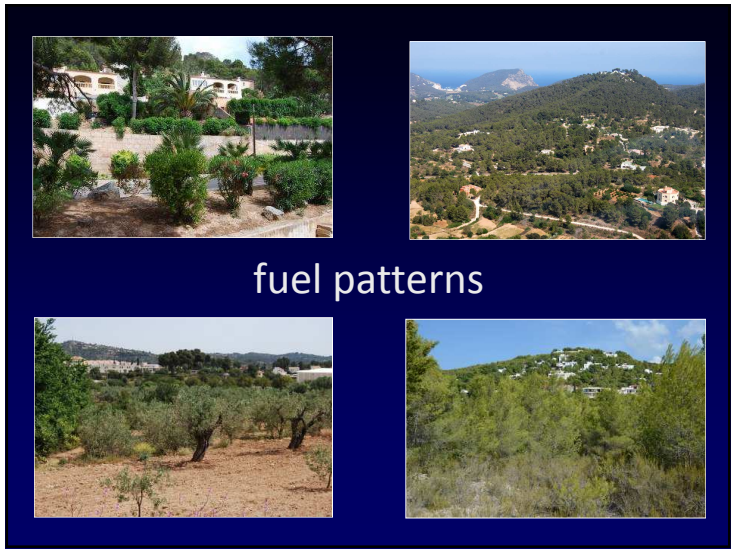
Solsona, Firefficient Workshop, 12/06/2014

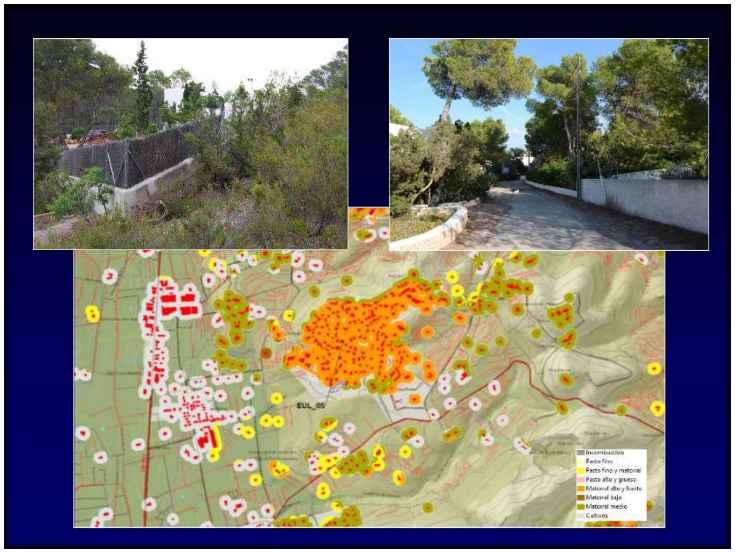


heterogeneous

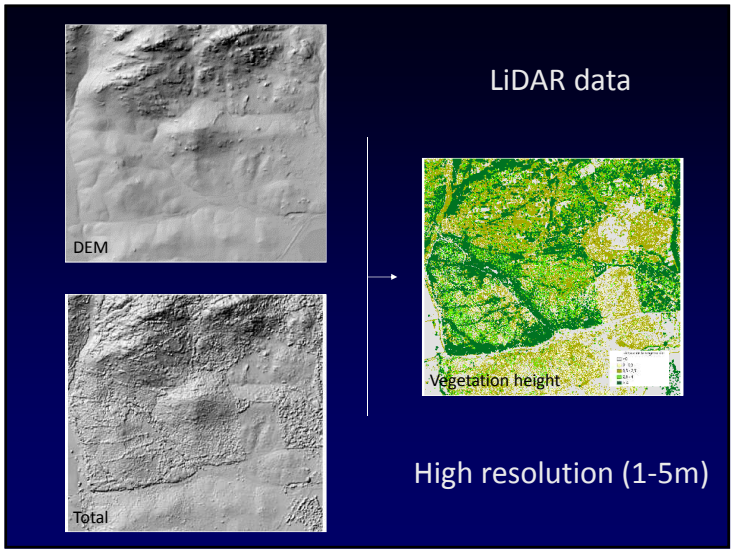
W-UI

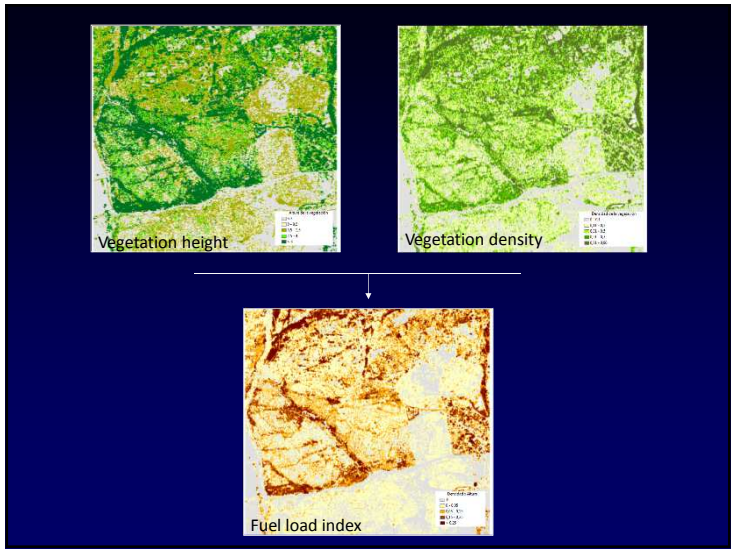
highly fragmented

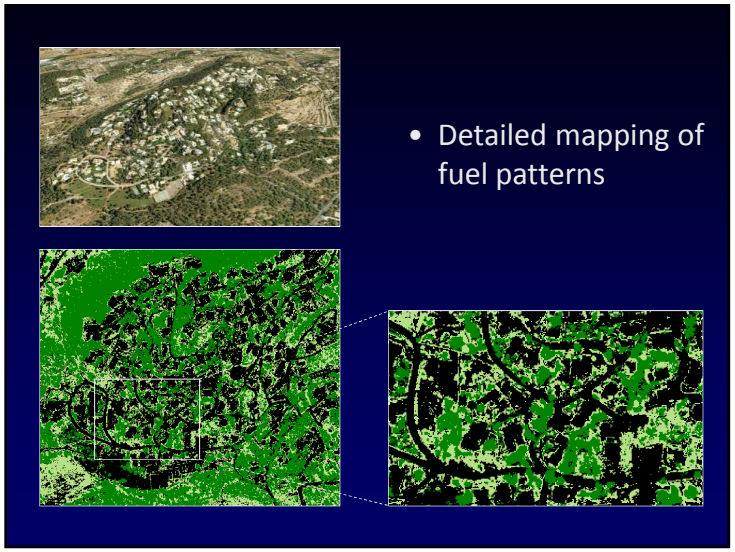

fuel patterns

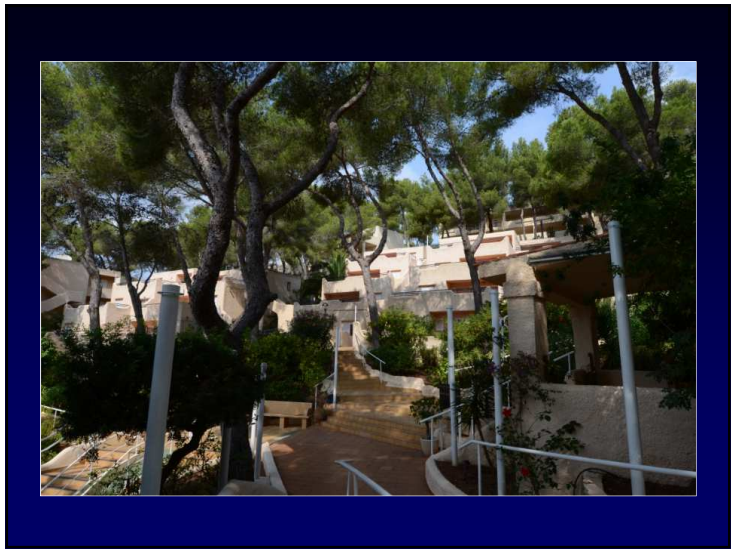


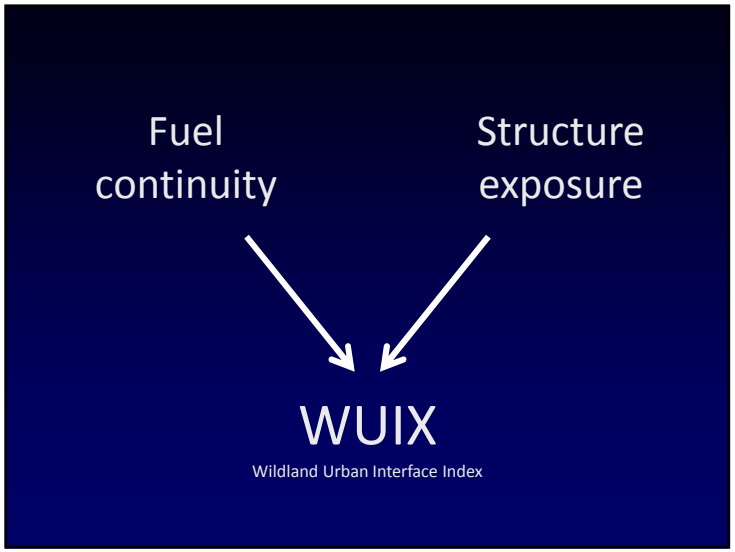

6 m
2 m
1,5 m


LiDAR data
DEM
Total
Vegetation height
High resolution (1-5m)

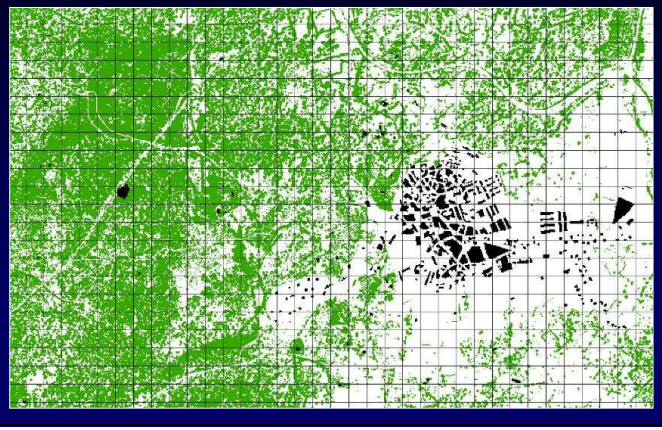

Vegetation height
Vegetation density
Fuel load index


• Detailed mapping of fuel patterns

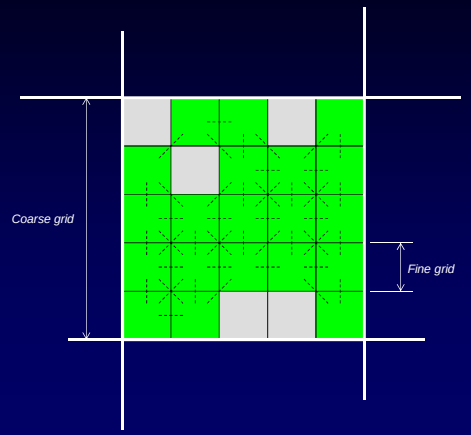



Fuel continuity
Structure exposure
WUIX
Wildland Urban Interface Index

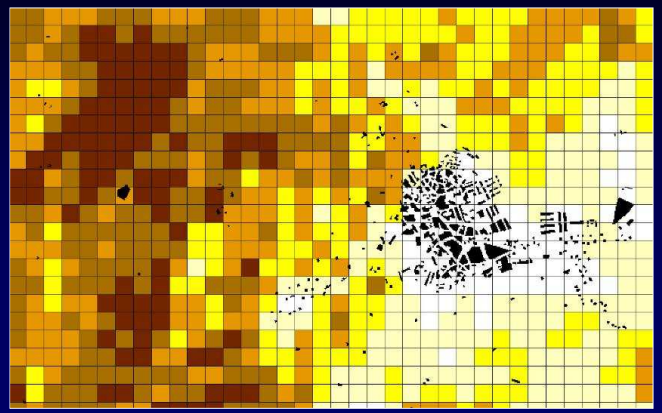
Ocupation



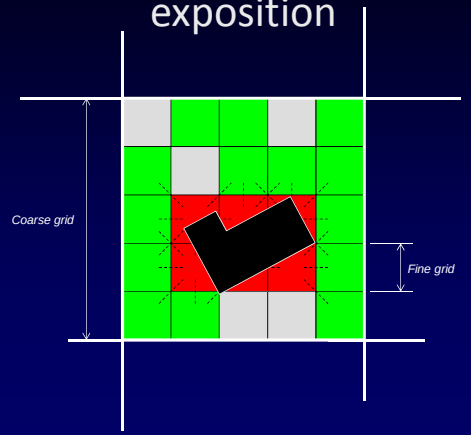
Continuity



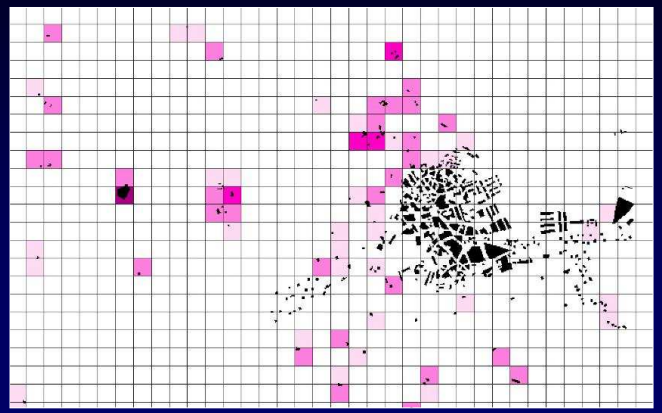
Continuity



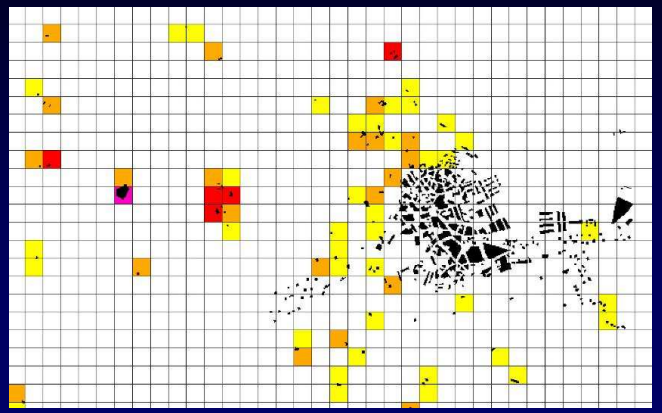
Structure exposition



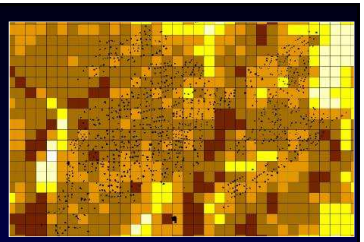
Exposition



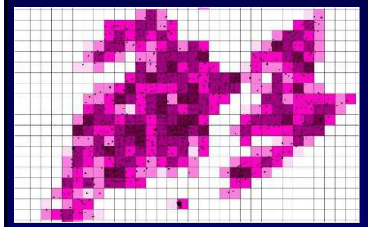
WUI index= Continuity · Exposition



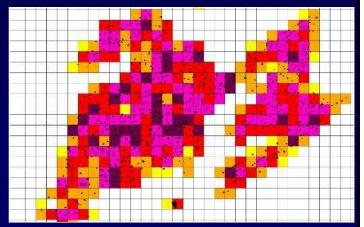
Ocupation



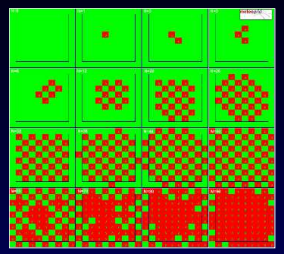
Continuity



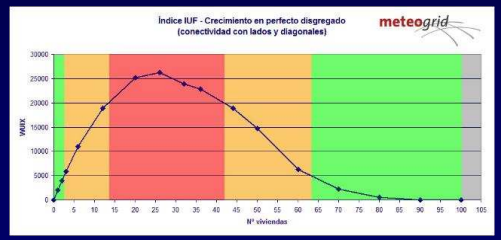
Exposition

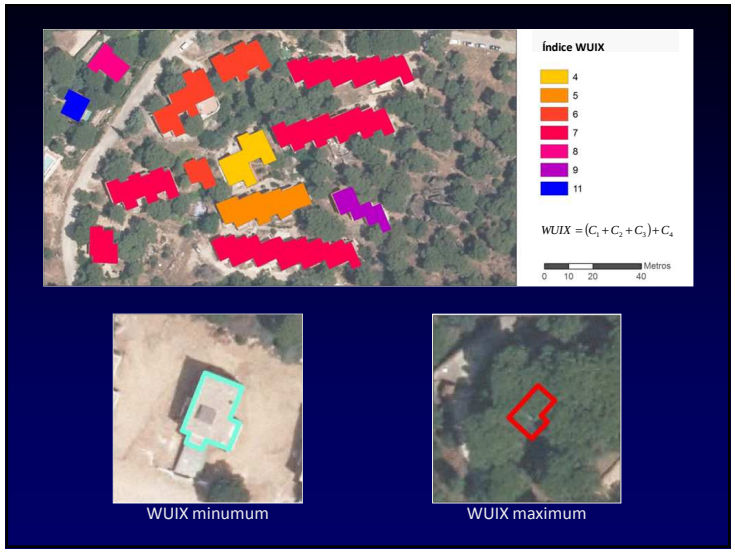


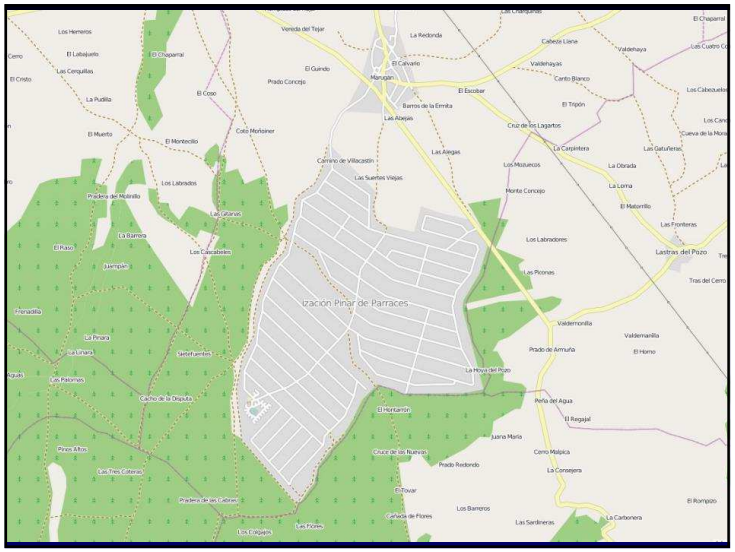
WUIX

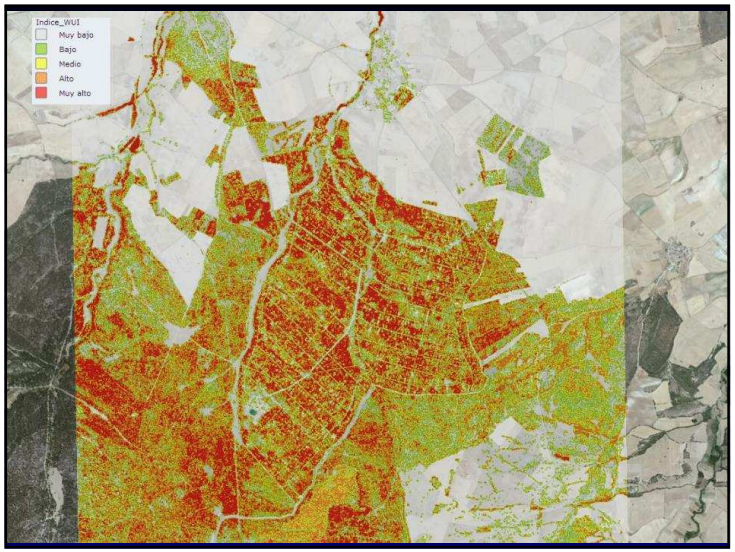


Evolution of a perfect *intermix*

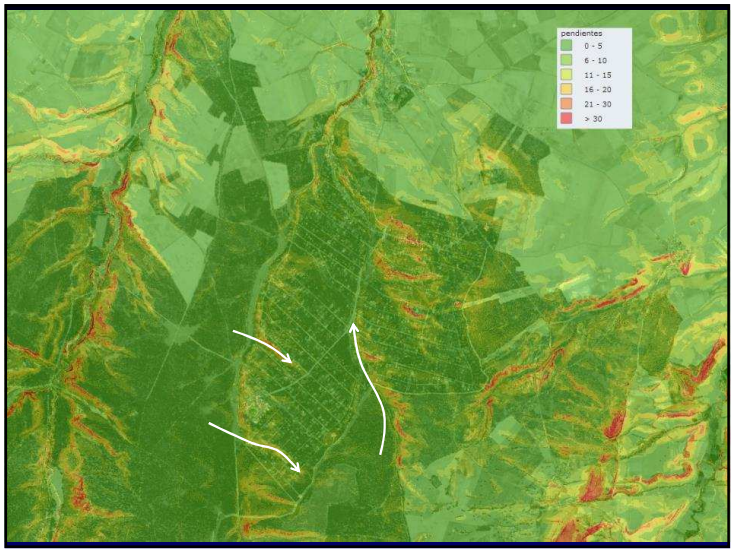


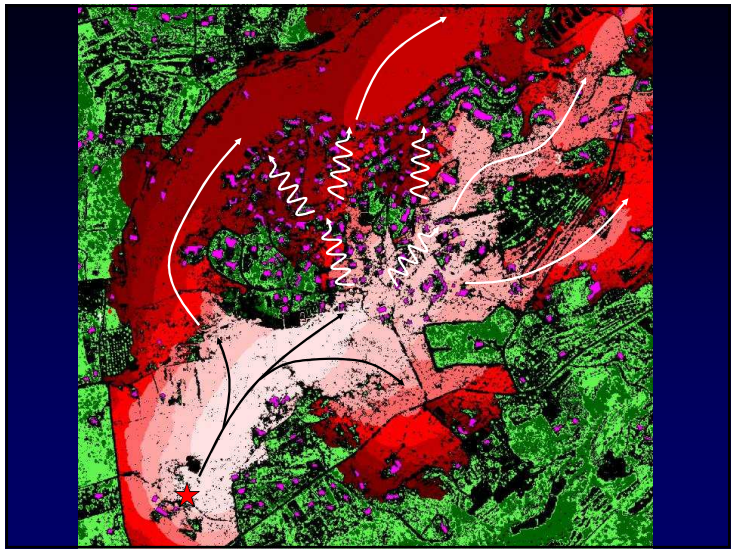

Índice WUIX
4
5
6
7
8
9
11
$WUIX = (C_1 + C_2 + C_3) + C_4$
Metros
0 10 20 40
WUIX minumum
WUIX maximum

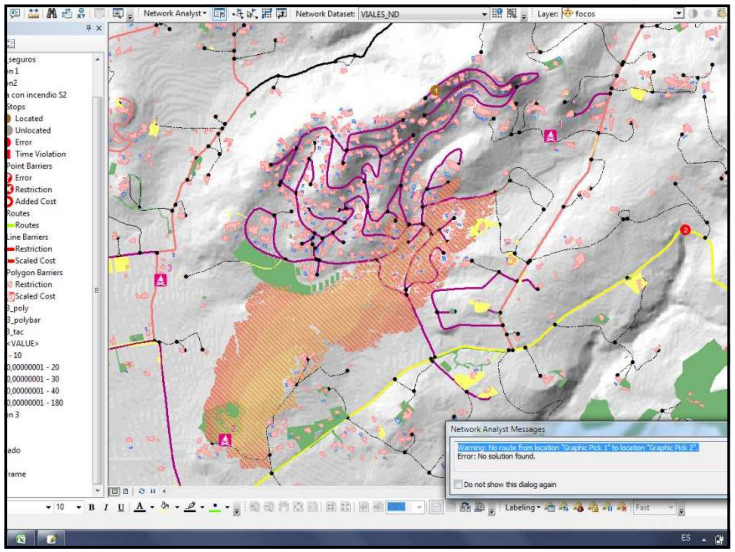

Izacion Pinar de Parraces

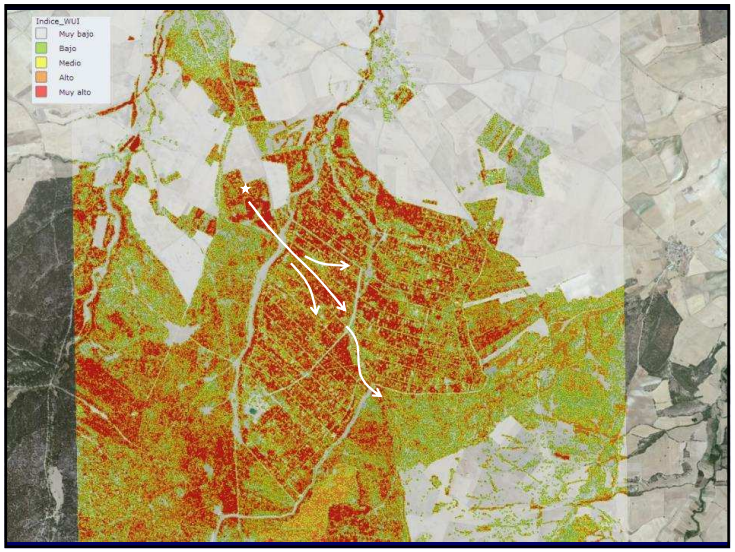

Indice_WUI
Muy bajo
Bajo
Medio
Alto
Muy alto

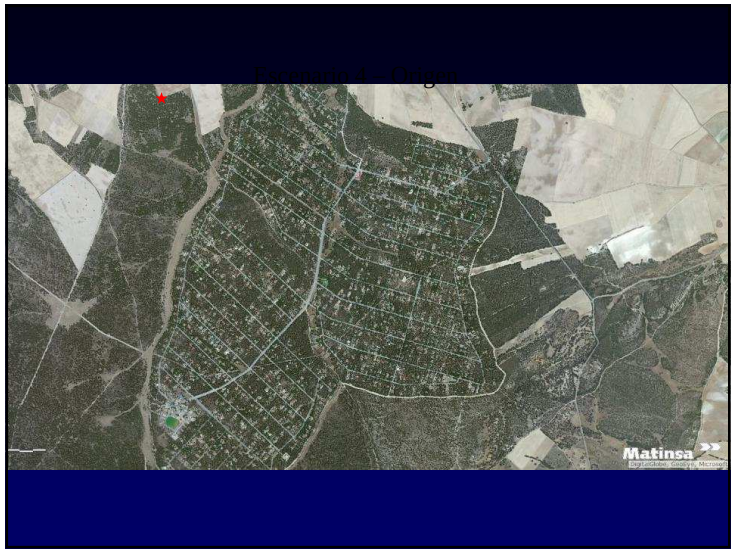

Escenario 1 - Origen (detalle)
Matinsa


pendientes
0 - 5
6 - 10
11 - 15
16 - 20
21 - 30
> 30




Network Analyst
Network Dataset: VIALES_ND
Layer: focos
Network Analyst Messages
Error: No solution found.
Do not show this dialog again


Indice_WUI
Muy bajo
Bajo
Medio
Alto
Muy alto


Escenario 1 - Origen
Matinsa


Escenario 1 - Paso 1
A
Matinsa
A. Primer paveseo, fuego fuerte y estrecho, focos secundarios progresan bien por el pinar

Escenario 4 – Paso 2

1. Vivienda 4.1 muy afectada por las pavesa y el humo, casa de madera, accesible, defendible, pradera, pinar claro, un vehículo
B. Salto de pavesas largo, mucho humo, el foco secundario progresa bien

Vivienda 4.5

Escenario 4 – Paso 3

2. Vivienda 4.2 rodeada por vegetación en llamas, buena construcción, accesible
3. Vivienda 4.3 recibiendo paveseo y mucho humo, vegetación alrededor, por atrás tocando la casa tres personas dentro
4. Vivienda 4.4 pradera, poca vegetación buena construcción, arbolado claro, dos perros. El fuego se acerca rápidamente.

Escenario 4 – Paso 4

5. Hay un vehículo en llamas
6. Foco secundario en parcela sin construir acumulación de restos, el fuego está cobrando fuerza
7. Vivienda 4.5 pequeña, rodeada de pinos bajos, recibe pavesas, humo, llamas muy cerca, un vehículo probablemente gente dentro
8. Parcela sin construir, mucho combustible por quemar pero no hay restos ni acumulaciones. Recibiendo pavesas
9. Emergencia médica, miembro de retén sufre quemaduras por deflagración de una garrafa de gasolina

Parcela sin construir (punto 8)

Escenario 4 – Paso 5

10. Vivienda 4.6 inserta en zona de pinos bajos, con accesibilidad y área defendible en parcela de al lado
C. Foco secundario en zona de pinar más denso con sotobosque y mucho pasto, potencial de desarrollo en toda la parcela (ver Escenario 1)
D. Pavesas saltan la calle a parcela con mucho pinar, potencial de desarrollo

Vivienda 4.6

Escenario 4 – Paso 6


Escenario 3 – Frente principal
Matinsa
Frente desarrollado que se desplaza con fuerza en cabeza, paveseando y saltando caminos y discontinuidades, presencia de humo y columna ya consolidada


Escenario 3 – Paso 2
A
Matinsa
A. Primer paveseo que da foco secundario, zona de mucho matorral, encina, pino y regenerado. Viento va a más ligeramente, sigue soplando de SSW.


Escenario 3 – Paso 3
C
B
Matinsa
B y C, nuevos paveseos ya dentro de la urbanización, B con matorral fuerte, pinos y pasto seco; C zona perimetral, mucho pasto seco, arbolado ralo, fuego progresa rápido

Escenario 3 – Paso 4

1. Paveseo que cae en pasto, desarrollando foco secundario y afectando depósitos GLP
2. Vivienda 3.1 afectada por el paveseo, combustible alrededor, claraboya abierta, buena construcción, vehículo en la parcela
3. Vivienda 3.2 afectada por el paveseo, mucho material en la parcela, pero vivienda sólida y relativamente separada del combustible

D. Nuevo salto en zona de matorral y otro combustible pesado, el viento hace que progresen todos los focos secundarios

E. El frente principal progresa con fuerza, fuera de capacidad de extinción, en el flanco derecho todavía se sujeta en la faja perimetral

Depósitos GLP

Escenario 3 – Paso 5

4. Nuevos paveseos que saltan faja perimetral y entra en parcela afectando vivienda 3.3 muy embutida en la vegetación, de madera, poco accesible. El foco secundario progresa con facilidad por la presencia de pasto
5. Vivienda 3.4 afectada por el progreso del foco secundario, muy embutida también en la vegetación, poco accesible

F. El fuego sigue fuerte en cabeza, paveseando y saltando al otro lado del camino, pasto, matorral y pinar abierto. Coge fuerza en este punto, manteniéndose estrecho.

Vivienda 3.4

Escenario 1 – Paso 6

6. Paveseos afectando a vivienda 3.5 bajo arbolado, prende el tejado, vivienda sólida pero muy rodeada de vegetación
7. Paveseos afectando a vivienda 3.6, hay dos personas mayores que no han querido evacuar.
8. Vivienda 3.7 de madera, muy embutida en la vegetación con arbolado por encima, recibe lluvia de pavesas, muy cerca de las llamas
G. Nuevo paveseo en zona de matorral, pino y chaparra de encina muy densa, en alineación con el viento puede consolidar. Algunas instalaciones (invernaderos) de plástico

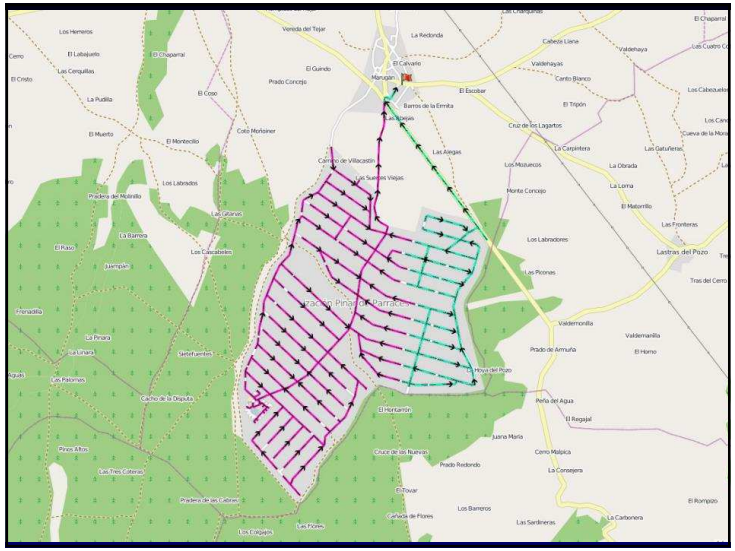
Paveseo en punto G

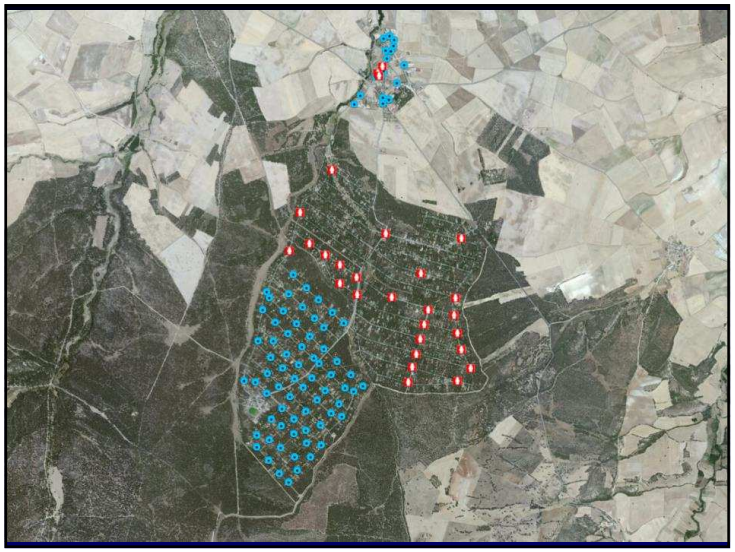
Vivienda 3.7

Escenario 3 – Paso 7

8. Vivienda 3.7 en llamas. H. Nuevo paveseo que salta la faja perimetral hacia el monte, se recoloca y sube otra vez hacia la urbanización
10. Vivienda 3.8 afectada por las pavesas en la parcela, pero no el edificio
11. Vivienda 3.9 con setos ardiendo, garaje abierto, perros, no se ve a nadie, no hay vehículo
12. Se notifica una urgencia médica de una persona mayor con posible infarto
13. Vivienda 3.10 recibiendo paveseo, zona de pradera sin combustible por debajo, solo pinar claro

Vivienda 3.10





Thanks!

Any easy question?

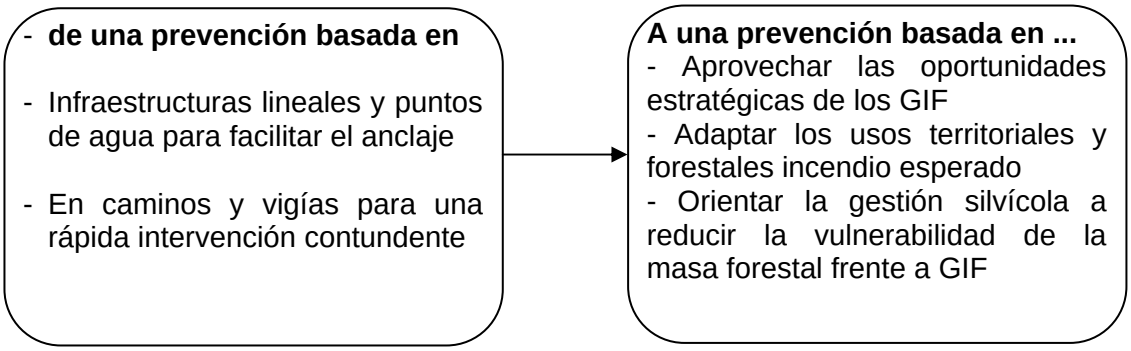
david@meteogrid.com

1. Implementación de los incendios tipo como herramienta de soporte a la gestión del paisaje.

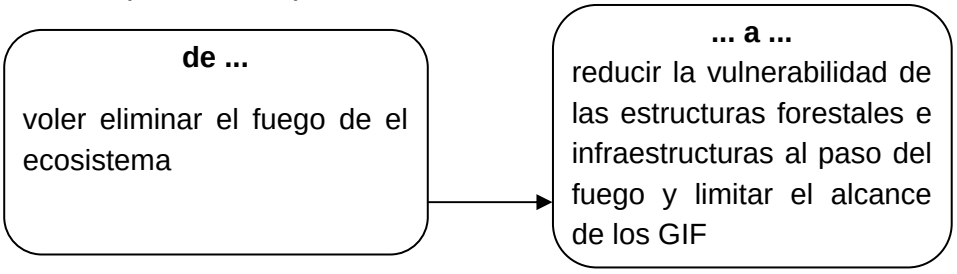
Buena parte de los sistemas de prevención y extinción de las diferentes regiones de Europa tienen como origen un escenario caracterizado por incendios forestales que afectaban superficies grandes en un paisaje con menos proporción de vegetación arbolada, menos infraestructuras de prevención (accesos, áreas cortafuegos, sistema de detección y alarma, previsión de riesgo, etc) y menos recursos de extinción que los actuales.

La evolución del paisaje comentada anteriormente ha hecho evolucionar los GIF hacia un escenario caracterizado por fuegos de copas, afectación a interfases urbanas (IZ) y simultaneidad de incendios forestales, que implican una importante limitación de oportunidades, incluso para servicios de extinción bien dotados y organizados.

Esta evolución en la concepción de los GIF debe ir acompañada de cambios en el enfoque del problema para pasar:



Las políticas de erradicación total del fuego del ecosistema han sido poco eficientes ante escenarios de GIF. Las características climáticas, de vegetación y de uso tradicional del fuego son indicadoras de que el fuego es un elemento del ecosistema que tarde o temprano terminará afectando alguna porción del territorio. El papel de la gestión forestal está en elegir con qué grado de intensidad y severidad acepta el paso del fuego y llevar a cabo una gestión forestal extensiva a todo el territorio para crear estructuras tolerantes al paso del fuego. En este contexto, el cambio en el objetivo de la prevención pasa:



1.1. El incendio tipo como elemento de planificación. Escala y ámbito de trabajo.

La propagación del próximo GIF sigue sin ser totalmente previsible, pero tenemos una serie de herramientas que nos ayudan a entenderla cuando la vemos, ya anticipar comportamientos probables, reduciendo la incertidumbre. Entre estas herramientas destaca el traspaso de las experiencias operativas del sistema extintor capitalizadas en los llamados incendios tipo '. Estos son una herramienta clave para el mundo de la prevención para diseñar, planificar y ubicar las infraestructuras necesarias para hacer frente a los incendios (cortafuegos, áreas cortafuegos, franjas auxiliares, caminos, etc.).

La implementación de los incendios tipo en la planificación intenta profundizar esta línea de trabajo dando más concreción en las características principales del GIF más probable que afectará una zona, basándose en el modelo de anticipación del movimiento esperado y su patrón de propagación.
En el marco de la política forestal y de las figuras de planificación de las administraciones públicas se generan diferentes aplicaciones de los incendios tipo para diferentes escalas o ámbitos de organización (Tabla 4):

Taula 1. Escales per a la planificació de les actuacions de prevenció.

Escala	Permite...	Aplicaciones
Planificación territorial	Determinar el grado de vulnerabilidad de un territorio ante la afectación de un GIF e identificar niveles de riesgo.	Evaluar la idoneidad y autoprotección necesaria en usos territoriales y tipo de paisaje. Determinar los incendios tipos esperados cada zona homogénea de régimen, y marcar criterios generales para limitar la capacidad de propagación.
Macizo forestal	Determinar en la escala de trabajo de los planes de prevención de incendios una serie de pautas básicas para limitar el alcance de los GIF, y para reducir la vulnerabilidad del territorio.	o Determinar puntos estratégicos de gestión (PEG), para preparar las oportunidades que el próximo GIF puede ofrecer al sistem extintor. o Determinar áreas de fomento de gestión (AFG), para reducir la capacidad de propagación del próximo GIF. o Determinar los incendios de diseño del macizo, especificando las singularidades del territorio respecto al incendio tipo genérico, para ajustar los criterios a la hora de situar y dimensionar la prevención y pre-extinción de incendios: Pegs, AFGs, puntos sensibles, accesos , puntos de agua, etc.
Finca forestal	Situar una finca ante el movimiento del GIF de la zona para poder planificar cada rodal según su vulnerabilidad ante el próximo GIF.	

1.2. Aportaciones a la pre-extinción; Incendios de diseño y Puntos estratégicos de gestión (PEG).

Incendios de diseño

La concreción en un territorio de los incendios tipos , ajustándose a las singularidades del territorio , se traduce en el concepto de incendio de diseño . El incendio de diseño representa el incendio de referencia máximo o con capacidad de ser GIF de un determinado macizo y aporta información y criterios para argumentar y localizar las medidas que se implementen para apoyar las tareas de gestión y extinción del ' incendi5 . Estas singularidades del territorio son de varios tipos :

• Singularidades según el relieve
• Singularidades según la evolución del episodio
• Singularidades según la disponibilidad de vegetación

Punto estratégico de gestión
El incendio de diseño permite conocer las características principales que explican el movimiento esperado de un GIF en una zona concreta , desgranando su esquema de propagación . La recogida de experiencias operativas y la sistemática de trabajo de cada cuerpo de extinción permite determinar el tipo de oportunidad más adecuada para cada relieve y tipo de combustible .

Por tanto , no cabe esperar el día del incendio para buscar oportunidades con el frente de fuego constriñendo la capacidad de análisis , sino que se puede planificar de forma previa, identificando las posibles oportunidades y adaptándolas a las necesidades del servicio de extinción .

Esta planificación previa permite identificar los puntos estratégicos de gestión (PEG) , localizaciones del territorio en las que la modificación del combustible y / o preparación de infraestructuras permite al servicio de extinción ejecutar maniobras de ataque seguras para limitar el alcance de un GIF .

Por cada incendio tipo se generan oportunidades con rasgos comunes y en consecuencia pegs con localizaciones , objetivos y características similares

Los pegs pueden tener diferentes objetivos :

• Puntos concretos limitantes del efecto multiplicador de la propagación de frentes : puntos de canvi10 de comportamiento que , por la interacción de la topografía con el movimiento del incendio , amplían el alcance del incendio . Pueden ser nudos de carena (Figura 11) en incendios conducidos por viento o nudos de barranco en incendios topográficos (Figura 10)

Figura 1. Nudo de barranco. En amarillo, la superficie potencial y, en rojo, el fondo de barranco. Fuente: Bomberos de la Generalidad de Cataluña.

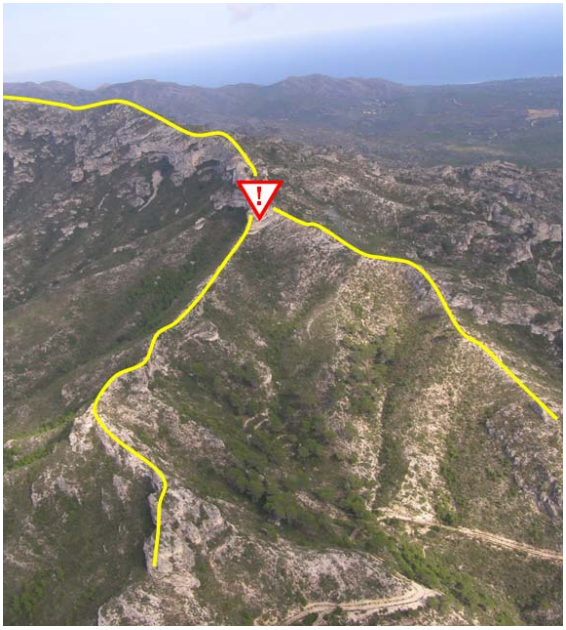


Figura 2. Imagen de un nudo de crestas. Fuente: Bomberos de la Generalidad de Cataluña.

- **Puntos desde donde se puede confinar la ignición:**
    - Para facilitar el anclaje de colas y flancos: apertura de senderos, caminos, bancales agrícolas o de roca, calles de plantación, líneas o áreas de baja carga que facilitan el anclaje de un ataque.
    - Para facilitar la accesibilidad: apertura de caminos para accesos a flancos muy largos (Figura 12).

Figura 3. Incendio forestal de St.. Boi (11/07/2005). En rojo, caminos que se aprovechan para la accesibilidad y el anclaje de flancos largos. Fuente: Bomberos de la Generalidad de Cataluña.

1.3. Aportaciones a la prevención. Limitación del alcance de los grandes incendios forestales

Implementar los incendios tipo en la escala de planificación territorial permite conocer las variables básicas del patrón de propagación , con lo que es posible valorar la aportación dentro de una Zona Homogénea de Régimen de cada unidad del paisaje (teniendo en cuenta la morfología , localización y tipo de combustible) al alcance final del GIF .

Limitación del alcance del incendio

Las propuestas resultantes no deben estar directamente ligadas a maniobras concretas de extinción , pero deben servir para desactivar los mecanismos de propagación que generan los GIF . Se deben planificar actuaciones que limiten aquellas estructuras forestales que , por sus características de continuidad vertical y horizontal de combustible , son totalmente desaconsejables en áreas concretas del territorio atendiendo al tipo de propagación del GIF de referencia de la zona .

A modo de ejemplo , se plantea el caso de paisajes sensibles a fuegos convectivos asociados a entradas de sur , como es la zona de la Cataluña Central , que generan GIF de claro movimiento sur-norte con lanzamiento masivo de focos secundarios en esa dirección . El patrón de propagación indica que las vertiente orientadas al sur (solanas) son las generadoras de los núcleos convectivos más intensos que provocan la generación de focos secundarios masivos en dirección norte (Figuras 13 y 14)

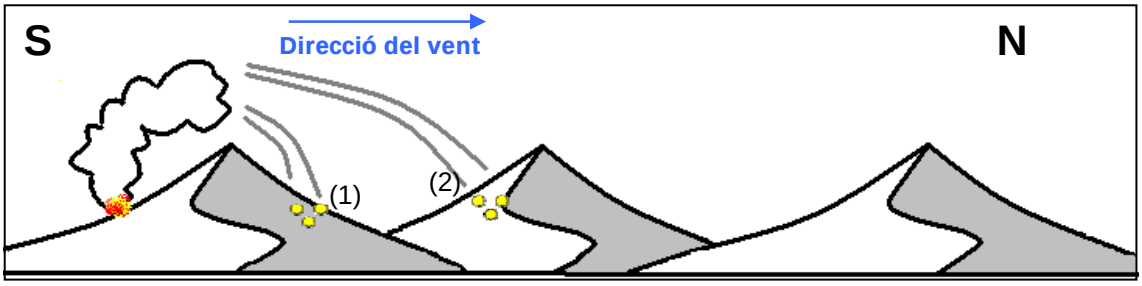


Figura 4. Escenario hipotético de una entrada de sur a la zona central de Cataluña, con movimiento del GIF en dirección sur-norte. El lanzamiento masivo de focos secundarios puede llegar a las laderas (1) o / y (2). En la situación (1), el foco secundario ascendente con la pendiente a favor, pero el viento y la orientación en contra. Un foco secundario o el inicio del fuego en la situación (2) sería la situación más desfavorable, ya que se trata de una ladera en plena solana, con el viento y la pendiente a favor. Fuente: Elaboración propia

Figura 5. Incendio forestal de Castellnou de Bages, 18/07/2005. Incendio de convección, se observa la propagación por puntos del frente de fuego. Fuente: Bomberos de la Generalidad de Cataluña.

Ante este escenario se puede plantear el mantenimiento de unas estructuras forestales con baja carga de combustible en las solanas, sobre todo en su parte superior, con el fin de limitar el lanzamiento y distancia de caída de focos secundarios. La idea es transformar una dinámica de propagación de alta velocidad, que implica saltos entre las solanas de forma consecutiva y cuasi-inmediata, a fuegos que pueden ser intensos pero de alcance más local que sólo afectarán dos vertientes (solana y umbría). En resumen, se pergsegueix transformar un fuego convectivo inalcanzable a un fuego topográfico más asequible (Figura 15).

De esta manera se pueden determinar áreas en las que las directrices de la gestión forestal tendrán como prioridad la dosificación de la carga y distribución del combustible, atendiendo siempre al patrón de movimiento del GIF.

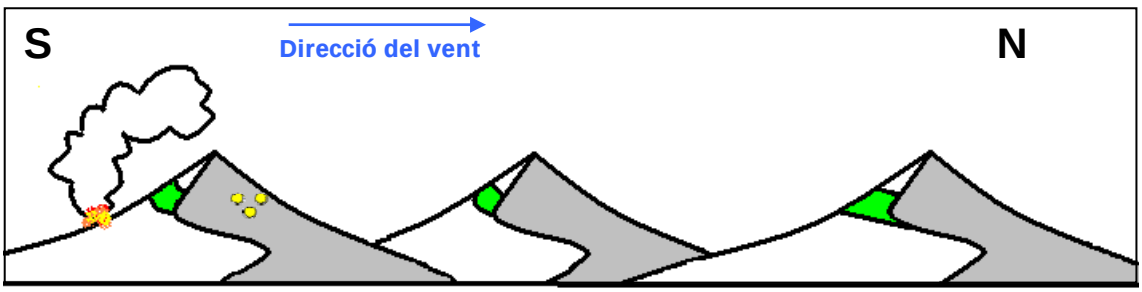


Figura 6. Escenario hipotético de una entrada de sur a la zona central de Cataluña, con movimiento del GIF en dirección sur-norte. En este caso, las zonas forestales gestionadas (en verde) limitarían el lanzamiento y la distancia de caída de los focos secundarios. Fuente: Elaboración propia**.**

Gestión de causas

Transformar el combustible en zonas de ignición habituales para limitar la propagación y minimizar los requerimientos de recursos de extinción, sobre todo en las áreas periurbanas y solares de polígonos industriales.

Protección de puntos vulnerables

Figura 7. Franja de baja carga de protección en una urbanización. Fuente: Bomberos de la Generalidad de Cataluña.

Los puntos vulnerables (núcleos rurales, masías, campings, urbanizaciones, granjas, etc.) Deberán protegerse creando infraestructuras para maximizar la eficacia del servicio de extinción en la defensa de estos puntos (Figura 16).

Figura 7. Franja de baja carga de protección en una urbanización. Fuente: Bomberos de la Generalidad de Cataluña.

1.4. Aportaciones a la gestión forestal

La determinación de las Zonas Homogéneas de Régimen (ZHR) permite conocer el periodo de retorno del fuego , y por tanto determinar la importancia de la perturbación fuego en cada una de ellas . El gestor forestal podrá ponderar el peso que le ha de dar a las actividades silvícolas orientadas a preservar la masa frente al paso del fuego o generar resistencia a la propagación , frente a otros factores que condicionan la gestión de un área concreta (otras perturbaciones , calidad de estación , fauna protegida , etc .) . De esta manera se puede empezar a trabajar en la creación de itinerarios silvícolas orientados a generar estructuras forestales menos vulnerables y más resistentes al paso del fuego .

No se trata sólo de trabajar en áreas concretas para confinar un incendio forestales (pegs) , o definir zonas con objetivo prioritario de dosificación de cargas de combustible para limitar el alcance de un eventual GIF , sino de dotar a las estructuras forestales de características dasonòmiques que generen resistencia a la propagación de fuegos de alta intensidad y que, en consecuencia , faciliten las tareas de control del incendio .

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Departament d'Interior
Direcció General de Prevenció, Extinció d'Incendis i Salvaments
Subdirecció General Operativa
Divisió de Grups Operatius Especials

2. Muestra de imágenes comparativa de revolución del paisaje en la Serra de Castelltallat los últimos 60 años.

Ortofoto 1. 1956

Ortofoto 1. 2008

Ctra. de la Universitat Autònoma, s/n
08290 Cerdanyola del Vallès
Tel. 93 582 03 00
Fax 93 586 79 80

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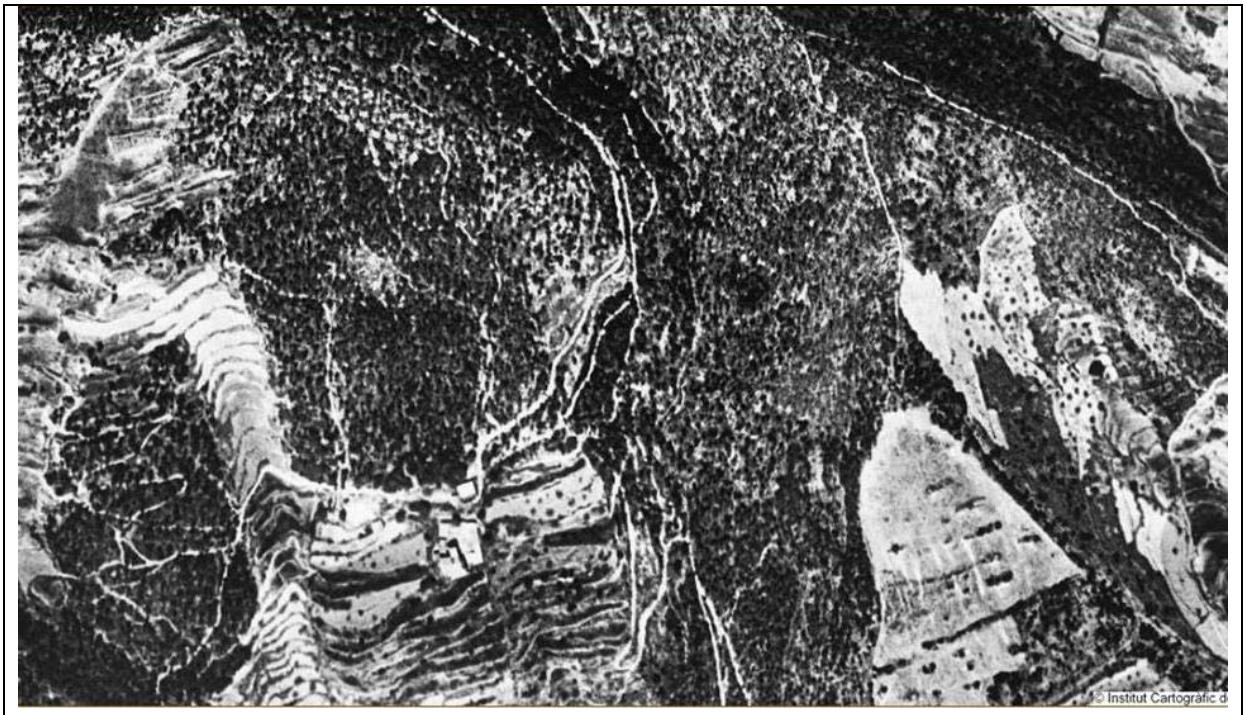

Ortofoto 2. 1956

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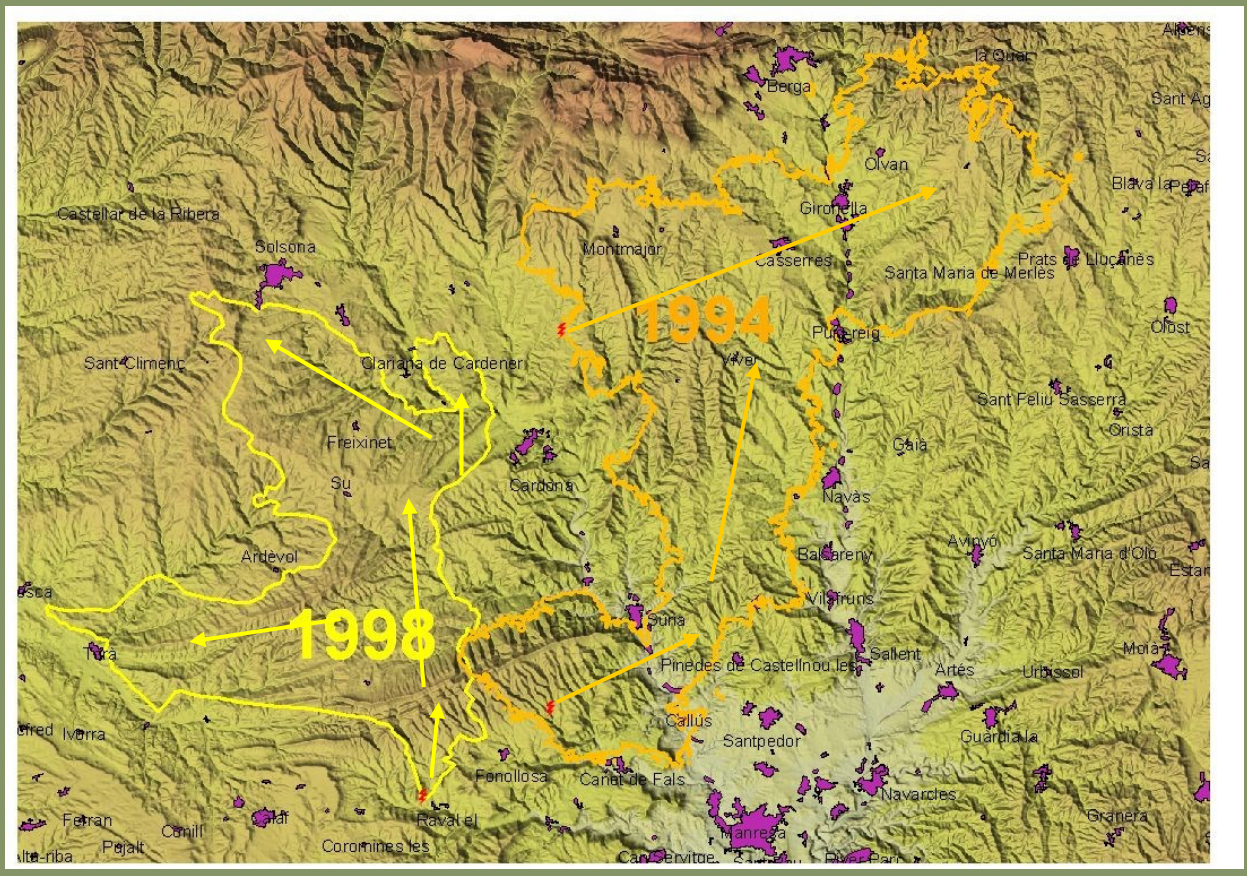
GRANS INCENDIS FORESTALS A LA CATALUNYA CENTRAL

- **BAGES—BERGUEDÀ 1994**
- **SOLSONÈS 1998**



- **COMPORTAMENT DEL FOC**

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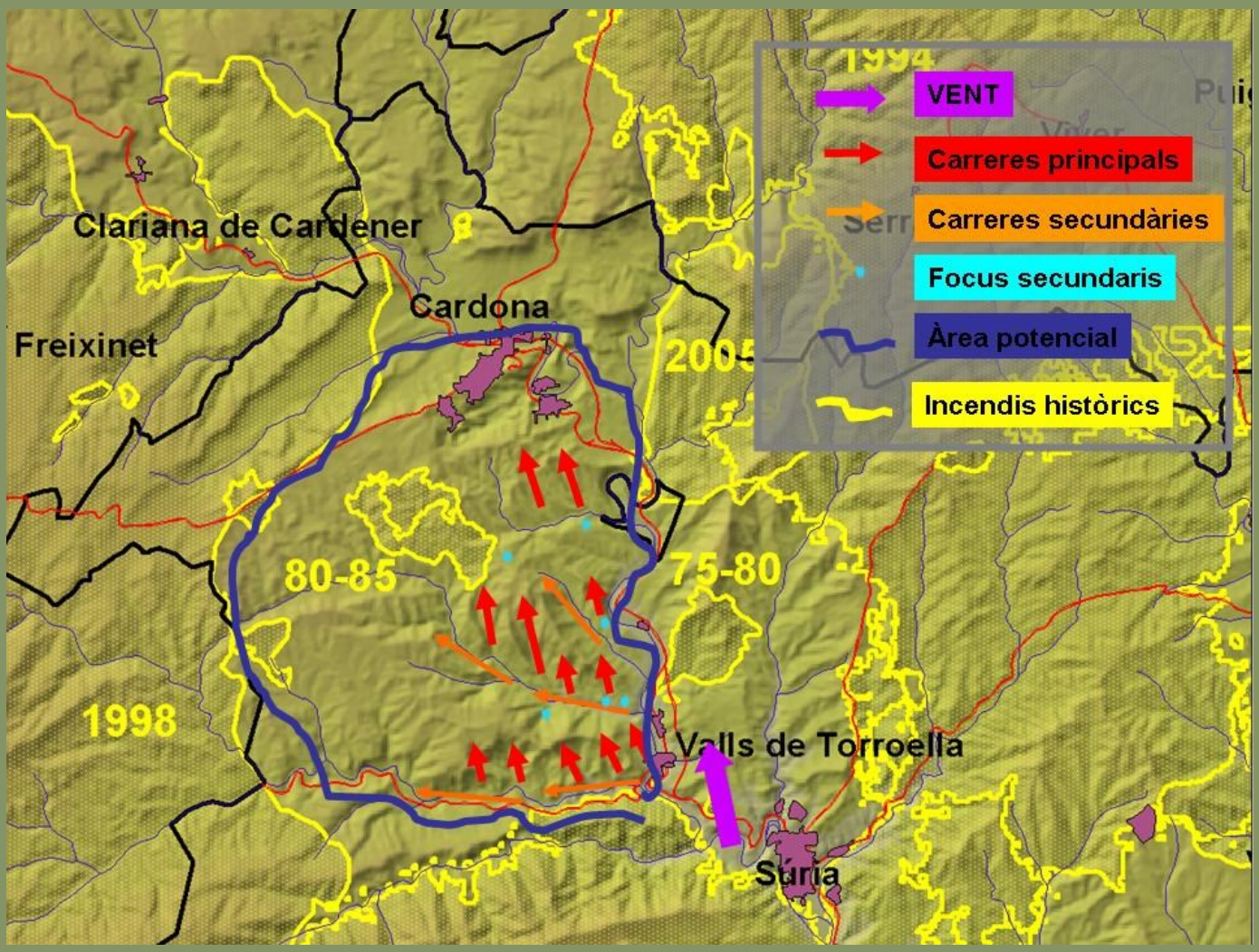
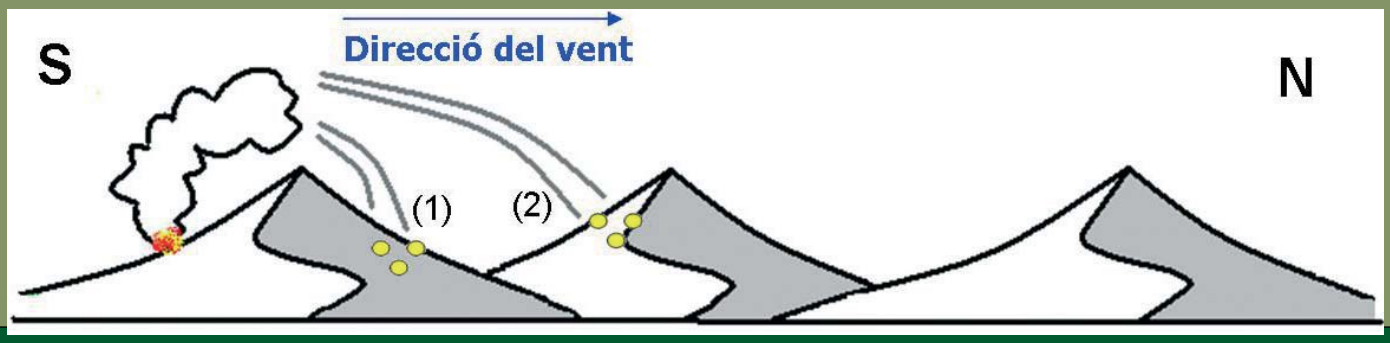
- **PATRÓ DE PROPAGACIÓ DE FOCS CONVECTIUS**





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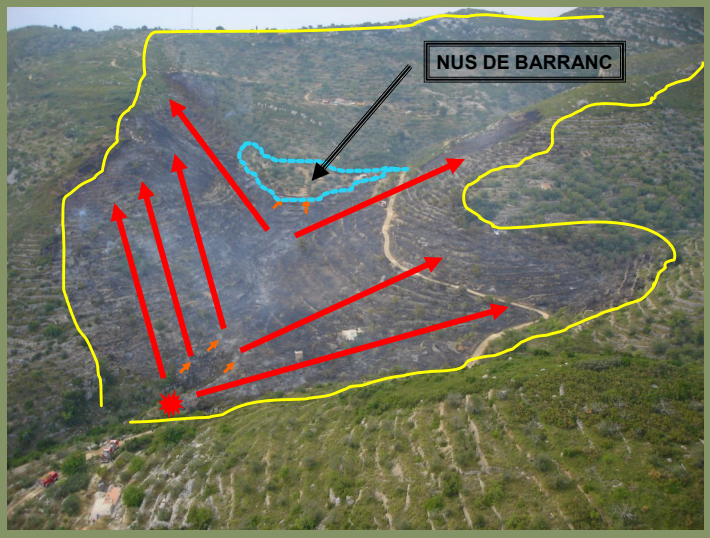
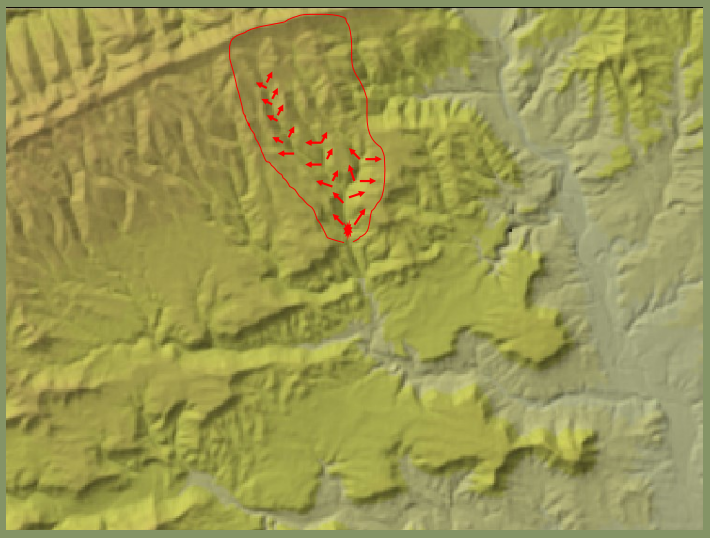
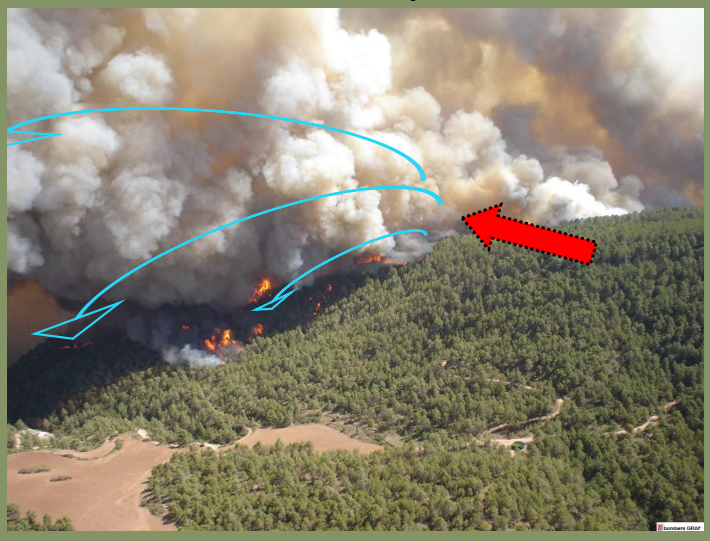
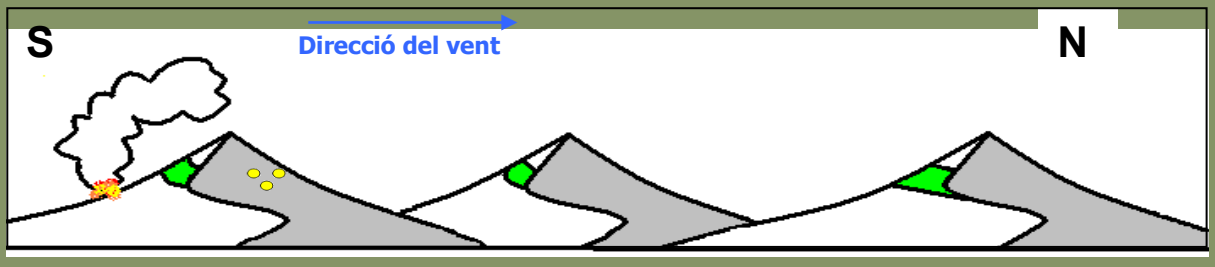
- **PATRÓ DE PROPAGACIÓ DE FOCS TOPOGRÀFICS**





- **PUNTS ESTRATÈGICS DE GESTIÓ (PEG) I ÀREES DE FOMENT DE LA GESTIÓ (AFG)**
  - **Nusos de barranc i parts altes de vessants sud i oest.**





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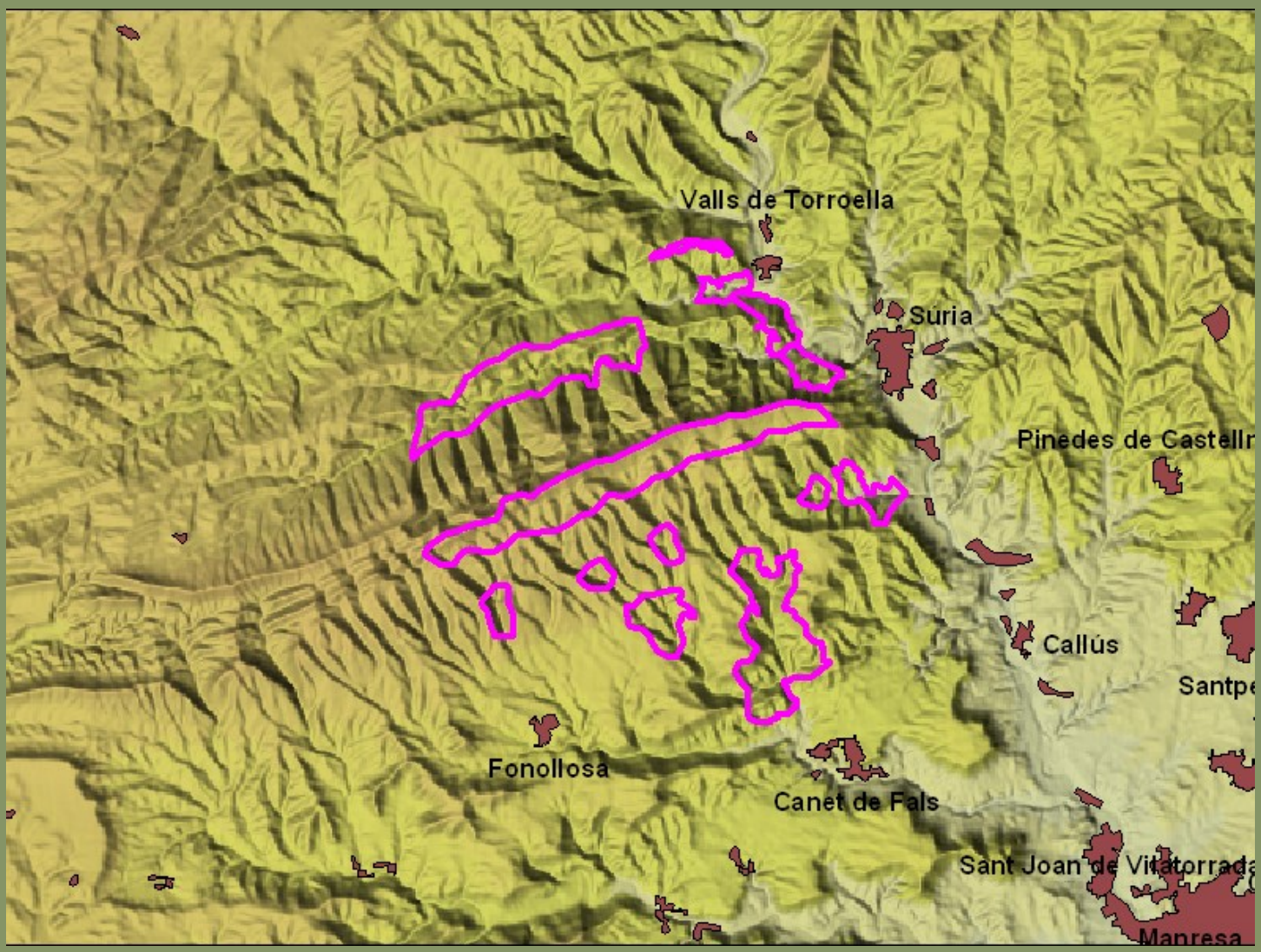
GRANS INCENDIS FORESTALS A LA CATALUNYA CENTRAL

- **PEG I AFG DE LA SERRA DE CASTELLTALLAT**



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GRANS INCENDIS FORESTALS A LA CATALUNYA CENTRAL

- **ESTRUCTURES FORESTALS VULNERABLES A FOCS DE CAPÇADES**

SEVERITAT ALTA

SEVERITAT MITJA

SEVERITAT BAIXA

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Wildfire risk assessment tools and risk management for urban planning: Nuoro, a case study from the Mediterranean Basin

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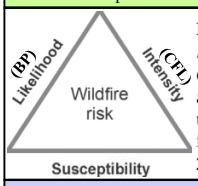
1.- INTRODUCTION

Forest fires are a growing problem in the Mediterranean area and cause substantial losses to vegetation, housing, infrastructures and human lives. Wildfire spread and behavior are affected by complex and non-linear relationships among many factors including weather, fuels, topography, and ignition patterns (Fig. 4; more than 90% fires are human caused).

Landscape fire behavior modeling offers a method to simulate, map and analyze fire spread and behavior at landscape scales for wildfire risk assessment and management for urban planning. In this work we use fire modeling to estimate: a) fire likelihood and intensity at landscape scale for WUI risk assessment, and b) the major wildfire flow paths for fire risk mitigation purposes.



Fire Risk is the expectation of *loss* or *benefit* to any social, economic and ecological value affected by fire. It is defined by three components: likelihood, intensity and effects (Finney 2005; Miller and Ager 2013).

2.- STUDY AREA

- **Location**: Nuoro (central Sardinia, Italy) (Fig. 1), approximately 700 km^2 (Fig. 2).
- **Vegetation:** grasslands and pastures in the open and flat areas; Mediterranean maquis occupies the less productive and previous pastures; broadleaf *Quercus* ssp. woods are located in the hilly, humid and north facing slopes; and herbaceous fuel types cover the valley bottoms.
- **Topography:** slightly defined NW-SE hilly reliefs, open and flat valleys in between and secondary narrow watersheds leading from the mountains perpendicularly to the open valleys; average elevation 470 m, with ranges from 48 m to 1,344 meters (Fig. 2).
- **Weather:** Mediterranean climate, with moderately cold wet winters (January and February) and hot and dry summers (July and August, peaks of more than 35°C), and mean accumulated annual rainfall of about 700 mm.
- **Wildfire history:** the study case is located in a fire prone area with many observed large fires (e.g. Nuoro wildfire, 27th July 2009, 7.460 ha, 12 hour duration). 4% observed fires burned 80% area (Fig. 3).

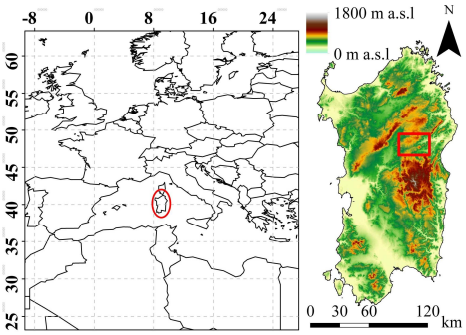


Figure 1 and 2 - Location of the island of Sardinia (Italy) in the Euro-Mediterranean region (left); the study area is framed by the red rectangle (right) over the elevation map of the island.

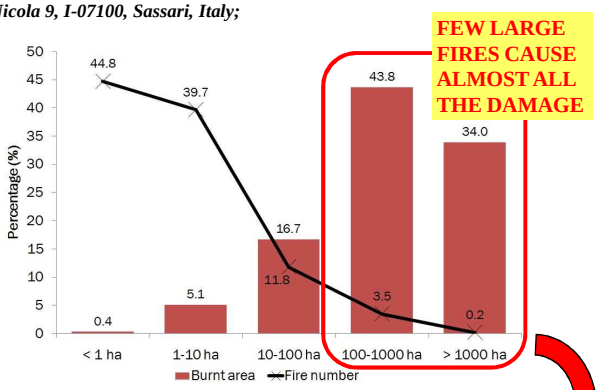


Figure 3 - Fire size classes of the observed wildfires in the study area (2003-2012; Sardinia Forest Service database, http://www.sardegnageoportale.it/).

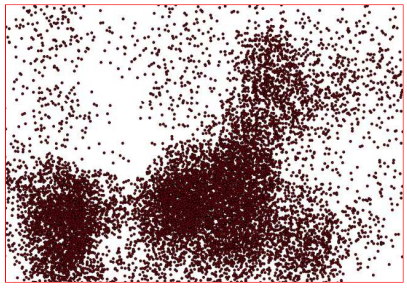


Figure 4 – Thousand fire historically based ignition pattern in the study area (2003-2012; Sardinia Forest Service database, http://www.sardegnageoportale.it/).

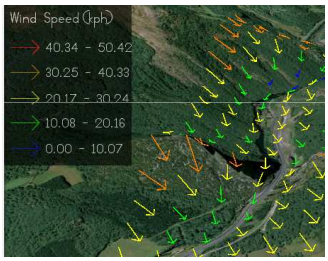


*Figure 5 –We can simulate the **wind direction and wind speed** fine resolution **grids** for extreme fire weather conditions; we used **WindNinja 2.3** (Forthofer 2007) mass consistent program.*

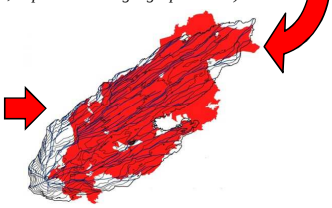


*Figure 6 – Fire modeling calibration. We can accurately replicate observed large fires (> 5.000 ha) in the study area using simulation (25 m resolution). **MTT fire spread algorithm** (Finney 2002) calibration for Mediterranean conditions.*

FIRE DATABASE

EXTREME FIRE WEATHER

SPATIAL ANDSCAPE DATA

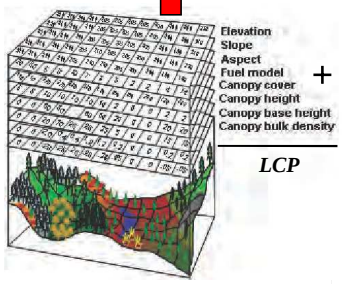


*Figure 7 – Spatial landscape data were assembled in the landscape file (LCP) using **ArcFuels10** (Vaillant et al. 2013). Figure from Finney 2002.*

FIRE SIMULATION

Saturate the landscape with thousand fires, using the MTT fire spread algorithm (Finney 2002) implemented in FlamMap 5 (Finney 2006).

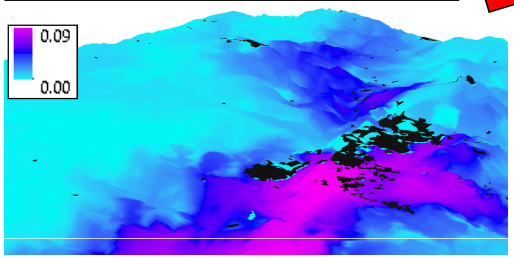


*Figure 8 – **Wildfire likelihood** 3D landscape maps, corresponding to burn probability **(BP)** simulation fine resolution outputs. Urban areas are show in black color.*

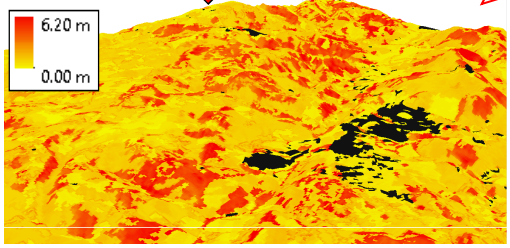


*Figure 9 – **Wildfire intensity** 3D landscape maps, corresponding to conditional flame length **(CFL)** simulation fine outputs. Urban areas are show in black color.*

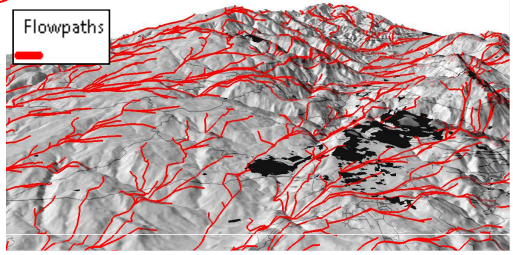


*Figure 10 – **Wildfire flow path 3D** landscape maps, shown in red over the hillshade map with the urban areas in black color, considering the dominant wind direction*

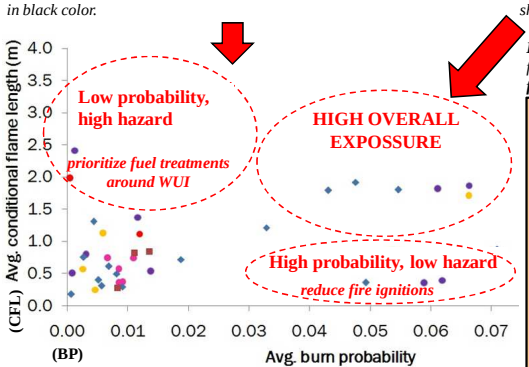


Figure 11 - Average BP vs. CFL scatter-plots for the WUI buffers; each point is corresponding to one WUI buffer average value in the study area. Scatter-plots result an interesting tool for comparing the fire exposure among the different WUI, prioritize surrounding fuel treatment and focus the fire ignition reduction efforts (Salis et. al 2012)

***Fuel treatment** on the **WUI structure surrounding hazardous fuels** reduces fire intensity and WUI structure susceptibility, and therefore also **reduces fire risk** on the valued resource areas.*

***Fuel treatment on the major flow path nodes** is an strategically located cost-efficient measure that reduces large fire arrival to the WUI structures , and therefore also **reduces fire likelihood** (and fire risk).*

3.- MATERIAL AND METHODS: INPUT DATA AND WILDFIRE MODELLING

- **Fire database**. Date and municipality of ignition, ignition coordinates and burnt area of the observed wildfires from 1995 to 2009 were used to generate a historic probability grid for the simulations.
- **Fuels and topography**: Fuels and topography data were assembled with ArcFuels10 in a landscape file (LCP). Topography layers were derived from the Sardinia digital elevation model (Fig. 2). Standard and custom fuel models were assigned (Arca et. al 2009; Scott and Burgan 2005) to the 2008 LULC main classes. The canopy cover characteristics were derived from INFC data.
- **Wildfire simulation parameters.** The simulations were run considering extreme fire weather wind grids (from dominant wind direction and observed 97th perc. wind speed) and fuel moistures (observed 97th perc.) and historically based thousands fire ignition pattern (10.000). We set 10 hour of active spread (without considering suppression), and 40 m resolution for the outputs
- **Minimum travel time (MTT)**: is the fire spread algorithm (Finney 2002) used to run the simulations, as implemented in FlamMap 5. The MTT finds the quickest path for a fire to each node on the landscape. Surface fire spread is predicted by the equation of Rothermel (1972).
- **Burn probability (BP)** is the chance that a pixel will burn at a given flame length interval considering one ignition in the whole study area under the assumed fuel moisture and weather conditions; **conditional flame length (CFL)** is the probability weighted flame length given a fire; and the **flow path** is the quickest path for a fire to each node on the landscape.
- **WUI fire exposure.** A 120m buffer around urban areas was considered to analyze wildfire exposure (avg. BP & CFL within buffer).

4.- RESULTS AND DISCUSSIONS

Fire modeling, previously calibrated (Fig. 6), can accurately simulate large fire spread and behavior. Recent advanced tools can help fire managers to easily produce required input data, as the spatial landscape data (LCP with ArcFUELS10) and wind grids (wind speed and direction grids with WindNinja2.3) for simulators (FlamMap5).

Fine scale output maps (BP and CFL; Fig. 8 and 9) were used to produce wildfire likelihood and intensity scatter-plots with average values within buffers around urban areas (Figure 11). This allowed defining different fire risk mitigation strategies (fuel treatment priorities in WUI surrounding with the highest intensities and ignition reduction efforts focused in WUI surroundings with the highest likelihood values). In addition, we calculated the major flow paths to identify the strategic sites (nodes) in the landscape were fuel treatments (as thinning, mastication and prescribed burns) reduce large fire spread, and therefore WUI wildfire likelihood.

ACKNOWLEDGMENTS

This work was developed during the stage in the CMCC IAFENT (Sardinia, Italy) for the development of the MasterFUEGO Thesis. I would like to specially thank the attention and the dedication of the teachers I had in the MasterFUEGO, and also all my class mates for their support.

Fire Efficient, Solsona (Spain)
12th & 13th June 2014

FIREfficient
Operational tools for improving efficiency in wildfire risk reduction in EU landscapes

This project is co-funded by the European Union

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Deliverable: Proceedings of the International Workshop on Wildfire Risk Assessment and Land Planning

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JEIF 2014

Los Incendios Forestales en INTERFAZ URBANA: hacia la integración del riesgo en la planificación del territorio

SEGUNDO ANUNCIO

BARCELONA,

27, 28 y 29 de OCTUBRE DE 2014

JORNADAS

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La finalidad del CUIMPB - Centre Ernest Lluch es la gestión del centro permanente de la Universidad Internacional Menéndez Pelayo (UIMP) en Barcelona. Nuestro centro universitario coordina y desarrolla las actividades propias de la UIMP: centro universitario de alta cultura, investigación y especialización, en el que convergen actividades de distintos grados y especialidades universitarias, y que tiene por misión difundir la cultura y la ciencia, así como fomentar relaciones de intercambio y de información científica y cultural de interés internacional e interregional.

Fundación Pau Costa

La Fundación quiere liderar un cambio profundo en la percepción que la sociedad tiene del fuego a través de la divulgación de conocimientos en la ecología del fuego y en la gestión de los incendios forestales, desde el ámbito técnico y de investigación, haciéndolos asequibles al mundo operativo y a la sociedad en general. Quiere al mismo tiempo ser una plataforma de referencia a escala internacional que haga posible el intercambio de información, de forma que también pueda ser asequible para comunidades menos favorecidas.

Instituto de Seguridad Pública de Cataluña.

Es el centro de creación y transferencia del conocimiento del sistema de seguridad pública de Cataluña y una pieza esencial en la construcción de un modelo caracterizado por la transversalidad de sus políticas y basado en la coordinación y la corresponsabilidad de todos sus operadores. Se creó por ley en 2007 con el objetivo de integrar en un único centro la formación integral, el apoyo a la selección y el desarrollo profesional de los diversos colectivos del sistema catalán de seguridad, siempre en colaboración con las organizaciones de las que dependen.

El Instituto es una entidad autónoma con personalidad jurídica propia adscrita al Departamento de Interior de la Generalidad de Cataluña.

PRESENTACIÓN De las Jornadas

En la mediterránea nos encontramos ante una nueva tipología de incendios forestales, una nueva generación de incendios que sobrepasan la capacidad de todos los sistemas de extinción demandando apoyo internacional y soporte multiagencia

Esta tipología de incendios se detecta también en otras áreas pobladas y de clima mediterráneo del planeta, como son California, suroeste de Australia, sur de Chile y sur África.

[...] Estos incendios se caracterizan por propagar sobre un nuevo tipo de combustible: las urbanizaciones, las zonas de interfase urbana - forestal.

Es decir, ya no tenemos un fuego que quema masa forestal y puede afectar una vivienda, sino un incendio que propaga por masa forestal y jardines o casas sin dificultad ni diferenciaciones. Estos incendios propagan aprovechando la densidad de vegetación dentro de jardines así como la continuidad de carga de combustible entre bosque, zona urbanizada y el propio edificio.

Durante el verano de 2003 vivimos incendios de 4 ª generación en Sant Llorenç Savall y Maçanet (Cataluña), Marsella y Nimes (Francia), Génova (Italia) y el centro de Portugal, propagando con alta intensidad y velocidad dentro de zonas urbanizadas, no como fruto de la inercia que el fuego ha tomado en la masa forestal, sino utilizando el modelo de combustible de los jardines y las casas. [...] (Castellnou et al, 2003)

Estos tipos de incendios que se desarrollan en áreas pobladas (en especial en los litorales mediterráneos). Conllevan una nueva tipología de emergencia, que traspasa la emergencia de incendios, convirtiéndose en emergencia civil, que demanda gran cantidad de recursos, y en muchos casos ayuda internacional.

Este nuevo paradigma, de fenómeno de escala global e implicaciones supranacionales, conlleva dar respuestas contundentes desde todos los ámbitos, objetivo principal de las Jornadas Euromediterraneas.

Estas respuestas deben darse no sólo desde el mundo operativo, sino desde el mundo del desarrollo y la investigación, desde el mundo de la ingeniería civil, la arquitectura y diseño de viviendas, la arquitectura y planeamiento paisajístico. De la misma forma también se debe abordar desde las autoridades con capacidad para legislar, afrontando sin prejuicios y con el apoyo de expertos estos nuevos retos.

Lista de **PONENTES**

Ponencias **INAUGURALES**

Luis Antonio Correa

Ingeniero Forestal por la Facultad de Ciencias Agrarias y Forestales. Escuela de Ciecias Forestales, Universidad de Chile. Miembro de la Corporación Nacional Forestal (CONAF), ingresó a esta institución en 1995, ocupando el cargo de Jefe de Supresión del Programa Manejo del Fuego Región de Valparaíso (equivalente al actual cargo de Jefe de Operaciones).

En 1996 y hasta la fecha, se desempeña en el cargo de Jefe Regional de la Sección Prevención, del Departamento Manejo del Fuego, Región de Valparaíso.

En el año 1998 y hasta la Fecha, asume como responsable del Programa de Educación Ambiental Forestal, que se ejecuta en conjunto con la Secretaría Regional Ministerial de Educación, Región de Valparaíso. A la fecha ha coordinado la realización de 5 cursos de Educación Ambiental Forestal (registrados en el CPIP), para Profesores de Enseñanza General Básica. Este Programa de Educación Ambiental, ha sido reconocido por el Ministerio de Educación, como uno de las cinco iniciativas ambientales, más importantes a nivel nacional.

En el año 2003, es nominado como representante de la Conaf en el Comité Regional de Certificación Ambiental para Establecimientos Educacionales. Instancia en que participan, entre otras instituciones, la Secretaría Regional Ministerial de Educación, la Conama y la Conaf.

Del año 2005 hasta la fecha, es Secretario Técnico del Comité Regional de Educación Ambiental de Conaf.

A partir del año 2008 es miembro del Consejo Docente del Programa Magíster en Desarrollo Regional y Medio Ambiente de la Universidad de Valparaíso.

En 2013, a partir de un proceso impulsado por la Gerencia de Manejo del Fuego, obtiene el carácter de Instructor USAID/OFDA de Sistema de Comando de Incidentes.

Robert J. Fenton, Jr.

Robert J. Fenton, Jr. actualmente tiene el cargo de Assistant Administrator for Response en la Oficina de Respuesta y Recuperación de la Agencia Federal para el Manejo de Emergencias (FEMA).

Sr. Fenton es responsable de coordinar la respuesta federal en apoyo de los Estados durante las grandes catástrofes. Coordina e integra entre agencias federales para todos los riesgos operaciones de planificación y respuesta a los desastres; gestiona los equipos de emergencia; y supervisa los programas de comunicaciones de emergencia para desastres.

El Sr. Fenton llegó a la sede de FEMA en julio de 2009 para servir como Acting Deputy Assistant Administrator for Response, donde jugó un papel decisivo en la elaboración de la reorganización de la Dirección de Respuesta y la Office of Response and Recovery, así como dirigir los esfuerzos focalizados la Dirección de Respuesta en la planificación de toda la comunidad catastrófica, desarrollo de la doctrina, la formación del personal / acreditación.

Desde su incorporación a FEMA en 1996, el Sr. Fenton ha jugado un papel importante en numerosas operaciones de respuesta y recuperación a gran escala en los EE.UU. y ha respondido a más de 50 desastres federales, incluyendo el huracán Katrina, los cuatro huracanes de Florida de 2004, el sur de California en los incendios forestales de 2003 y 2007, el Super Typhoon Pongsona en Guam y los ataques terroristas al World Trade Center de 2001.

Antes de unirse a la FEMA, el Sr. Fenton desempeñó el papel de Jefe de Operaciones de Campo para el Sistema de Abastecimiento de Agua Portable, con sede en Redwood City, California. En ese puesto, fue enviado a África central como miembro principal de las actividades de socorro de emergencia de respuesta de Estados Unidos para llevar asistencia vital a los refugiados ruandeses.

Sr. Fenton asistió a la Universidad de California en Davis, donde se especializó en economía y sociología. En la actualidad reside en el norte de Virginia con su esposa y sus dos hijos pequeños.

Dra. Anna Badia Perpinyà

Doctora en Geografía por la Universidad Autónoma de Barcelona (UAB) en 2001. Profesora Titular del Departamento de Geografía de la UAB, donde desarrolla su actividad docente (centrada en los SIG y su uso en los estudios de planificación territorial y ambiental), e investigadora (en temas relacionados con los incendios forestales, especialmente los que afectan en la Interfaz urbana-forestal).

Dra. Cristina Montiel Molina

Cristina Montiel Molina es Catedrática de Geografía en la Universidad Complutense de Madrid, donde imparte asignaturas de Ordenación del Territorio y dirige el Grupo de Investigación UCM-930329 Geografía, Política y Socioeconomía Forestal. Ha participado en varios proyectos europeos del Programa INTERREG y del VI y VII Programas Marco, y en redes de cooperación científica comunitaria. Dirige asimismo una línea de investigación pionera sobre incendios forestales históricos, financiada por el Plan Nacional I+D+i.

Sr. Joan Gallart i Olivé

Ingeniero industrial por la Universidad Politécnica de Cataluña, con la intensificación de medio ambiente, y Técnico Superior de Prevención de Riesgos Laborales.

Ha trabajado en el ámbito de la seguridad industrial en despachos técnicos de ingeniería y consultoría elaborando planes y estudios de seguridad. También ha trabajado en el sector de la seguridad laboral, desarrollando planes de emergencia y organizando simulacros en diversas tipologías de edificios y actividades.

Desde el año 2005 trabaja en la Dirección General competente en materia de prevención y extinción de incendios de la Generalitat de Cataluña; primero como ingeniero industrial, luego como subinspector del Cuerpo de Bomberos y jefe de la Sección de Prevención Normativa, y como jefe del Servicio de Prevención en la actualidad. Complementariamente a la tarea al Servicio de Prevención, actúa en funciones operativas del Cuerpo de Bomberos como Jefe de Guardia.

Sr. Marc Castellnou.

Presidente de la Fundación Pau Costa. Bomberos de Generalitat de Cataluña. Área GRAF. Analista de Incendios. Ingeniero Forestal (1997). Máster en Incendios Forestales (2005). Analista Jefe del Grupo de Actuaciones Forestales (GRAF) de la Dirección General de Prevención y Extinción de Incendios y Salvamento de la Generalidad de Cataluña (desde 1999), Director de Extinción de Incendios por el MIMAM (2006), Director de la UFF CTFC (1997-1999). Integrador del proyecto *Fire Paradox* (2006-2010). Coordinador de proyectos de investigación en los campos de la modelización de combustibles, ecología del fuego y gestión de incendios. Organización y ponencia en congresos de carácter internacional, cursos especializados y jornadas técnicas (1995-2010).

Dr. Luis Galiana Martín

Doctor en Geografía. Catedrático acreditado de Análisis Geográfico Regional en la Universidad Autónoma de Madrid (UAM). Premio Antonio Maura de Investigación Científica del Ayuntamiento de Madrid (1992). Imparte docencia sobre Ordenación del territorio en el Grado de Geografía y Ordenación del Territorio y en el Máster en Planificación y Desarrollo Territorial Sostenible de la UAM. Especialista en paisaje, posee numerosas publicaciones sobre la materia, interviniendo igualmente en diferentes proyectos de gestión. Ha formado parte de los equipos de redacción de varios planes urbanísticos y de Ordenación del territorio durante los últimos veinte años.

Sra. Pepa Morán

Pepa Morán Núñez, arquitecta paisajista. Nacida en Buñol, Valencia en 1974. Arquitecta por la ETSAV (Valencia), *Màster d'arquitectura del Paisatge* de la UPC y *Màster d'Ordenació Urbanística* DUOT-UPC. Desde 2005 es profesora del *Màster d'arquitectura del Paisatge* y desde el 2007 del *Màster Universitari en Paisatgisme* de la UPC.

En la actualidad comparte la profesión de arquitecta y paisajista con la docencia universitaria y la elaboración de la Tesis Doctoral en el Departamento de Urbanismo DUOT de la ETSAB: *Morfologías del Cambio, procesos en el proyecto de paisaje.*

Sra. Anna Zahonero

Anna Zahonero Xifré, Bióloga (UB) y Máster en Arquitectura del Paisaje (UPC). Profesora del Departamento de Urbanismo y Ordenación del Territorio de la UPC desde 2001 desarrollando las tareas de docencia en el Máster Oficial en Paisajismo y el Master de Arquitectura del Paisaje y de investigación en el Centro de resarcirse y Proyectos de Paisaje de la UPC. Desde 1993 desarrolla su actividad profesional en torno al estudio y la proyección del paisaje y el medio ambiente.

Carles Noguera Pola

Ingeniero industrial. Subinspector del cuerpo de Bomberos de la Generalidad. Jefe de guardia de bomberos en la Región de Emergencias Centro y Jefe de la sección de Prevención Operativa del Servicio de Prevención. Técnico superior en prevención de riesgos laborales y postgraduado en Riesgo y Gestión de la emergencia. Antes de trabajar en Bomberos de la Generalitat estuvo durante 4 años en varios servicios de prevención de riesgos laborales correspondientes a servicios de seguridad de mutuas de accidentes de trabajo de ámbito estatal.

Sr. Claudi Gallardo

Ingeniero Técnico Forestal e Ingeniero de Montes. Master en Incendios Forestales, Ciencia y Gestión. Desde el año 2007 vinculado al Cuerpo de Bomberos de la Generalitat como bombero voluntario y realizando diferentes tareas dentro de la Dirección General de Prevención, Extinción de Incendios y Salvamentos (Conductor de la Unidad de Punto de Tráfico, EPAF, Técnico Especialista Operador de Control, y en la actualidad, Técnico Especialista en el Grupo de Apoyo de Actuaciones Forestales, GRAF).

Sr. Ricard Expósito Miró

Bomberos de la Generalitat de Cataluña.

Sr. Moisés Galán Santano.

Bomberos de la Generalitat de Cataluña.

Jordi Guarque Sugrañes

Miembro del Cuerpo de Bomberos de la Generalitat desde el 1993 Inspector, ejerciendo funciones de jefe de guardia desde el 2002 y vinculado con el GRAF desde el año 2001. Licenciado en Químicas (UNED) y Geografía e Historia (URV) y Diplomado en Maestro (UB). Master en Gestión de Medio Ambiente (UdL).

David Caballero Valero

Ingeniero de Montes, pionero en la simulación de incendios (1989) y en la caracterización de las situaciones de interfaz en España (1999), coordinador del proyecto WARM sobre interfaz en Europa (2001-2004), ha coordinado el estudio de interfaz en España (2005-2006), participado en el estudio IUF en Portugal (2007) y dirigido numerosos estudios de interfaz en varias Comunidades españolas. Actualmente continua con el desarrollo de técnicas y métodos para la cartografía del riesgo por incendio en la interfaz y su aplicación en la planificación preventiva. Es el responsable del Departamento de Incendios Forestales en MeteoGrid.

Jose Luis Correa

Luis Correa Jiménez, Ingeniero Forestal de la Universidad de Chile y Magíster en Desarrollo Regional y Medio Ambiente, es especialista en ***Prevención y Combate de Incendios Forestales***, paralelo a lo anterior, ha estado ligado a la docencia por casi 20 años, ***Manejo del Fuego; Manejo de Cuencas; Dasometría; Fotogrametría, Suelos***, ***Ecología Humana y Ordenamiento Territorial,*** *han sido los temas más recurrentes en su carrera docente.*

Jordi Pagès Castellà

XXX. Eduard Plana XXX

PROGRAMA y Horario*

LUNES, 27 DE OCTUBRE DE 2014

9:00-9:30	**Presetación y bienvenida** **Director Académico/Conseller/Director Curs**
9:30-10:15	**Keynote Presentation** **Sr. JOSE LUIS CORREA.** LA ORDENACIÓN DEL TERRITORIO COMO FACTOR CONDICIONANTE EN LA CATÁSTROFE DE VALPARAÍSO

1ST SESSION.

VULNERABILIDAD, DEFINICIÓN E IDENTIFIACIÓN

10:15-11:00	**Dra. Anna Badia.** El valor del paisaje. Valor Histórico vs. Valor Estético
11:00-11:30	**Coffee BRAKE**
11:30-12:15	**Dra. Cristina Montiel.** Dinámicas territoriales y caracterización de las interfaces urbano-forestales frente al riesgo de incendios en España
12:15-13:00	**Sr. Moises Galán** Gestión de una emergencia en les WUI; información y condicionantes operativos
13:00-13:45	**Sr. Claudi Gallardo, Sr. Carles Noguera** Propuesta de medidas y condiciones técnicas de prevención y seguridad en edificaciones con afectación por incendios forestales.
13:45-14:15	**DISCUSSION**
14:15-16:15	**LAUNCH**

2ND SESSION.

INCENDIOS DE 4ª Y 5ª GENERACIÓN. VISIÓN OPERATIVA

16:15-17:00	**Sr. David Caballero.** Retos y avances en la cartografía del riesgo por incendio en la interfaz urbano-forestal
17:00-17:45	**Jordi Pagès Castellà.**
17:45-18:15	**DISCUSSION**

** El programa esta sujeto a cambios y modificaciones de última hora a consideración de la dirección del curso.*

MARTES, 28 DE OCTUBRE DE 2014

9:15-10:00	**Opening Day Session** **SR. ROBERT J. FENTON, JR.** LA GESTIÓN DE EMERGENCIAS DESDE EL MARCO DE LA FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) LECCIONES APRENDIDAS: INCENDIOS FORESTALES EN INTERFASE URBANA EN EEUU
10:00-10:45	**Sr. Marc Castellnou.** Incendios de Interfaz en el Mediterraneo. Visión de Futuro.
10:45-11:15	**Coffee BRAKE**
11:15-12:00	**Sr. Jordi Guarque** Estrategias y tácticas, los puntos claves en la gestión de los incendios forestales en las WUI.
12:00-12:30	**DISCUSSION**

3TH SESSION.

RETOS DE PLANIFICACIÓN Y LEGISLACIÓN DE UN NUEVO TERRITORIO

12:30-13:15	**Sra. Pepa Moran.** El fuego como perturbación del paisaje: Representación y proyecto
13:15-15:15	**LAUNCH**
15:15-16:00	**Sr. Luis Galiana.** Estrategias de mitigación y planificación territorial: una visión mediterránea
16:00-16:45	**Sr. Vincent Pastor.** Caso Estudio del departamento de Bouches de Rhone.
16:45-17:30	**Sra. Sonsoles Letang**. Análisis para la integración efectiva del riesgo de incendios forestales en la planificación urbanística.
17:30-18:00	**DISCUSSION**

MIÉRCOLES 29 DE OCTUBRE DE 2014

9:15-10:00	Opening Workshops sessions. **Eduard Plana.**

3RD SESSION.

SESIONES DE MESAS REDONDAS

MESA 1

	Frame: **Hacia una integración efectiva del riesgo de incendios forestales en la planificación del territorio i las zonas WUI**
10:00-11:30	**Facilitators:**
	IGC, ICC. Experiències en planificació risc d'allaus.
	ACA. Experiències en planificació risc d'allaus.
	DGMN-DAAR. La gestión del riesgo de incendios en la implantaciones de actividades de la planificación urbanística.
11:30-12:00	**BRAKE**

MESA 2

	Frame: **Avances y retos en el operativo de prevención y extinción en zonas WUI**
12:00-13:30	**Facilitators**
	Albert Bartolomé. El paper de les aseguradores.
	Ricard Expósito.

13:30-13:45	**CONCLUSIONS** **Mariona Borràs.** *Pau Costa Foundation*

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Os queremos presentar la primera publicación bajo este sello editorial:

Operaciones Aéreas en Incendios Forestales.

Coordinado por Juan Caamaño

Adquiérelo en paucostafoundation.org