FIREfficient

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

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Course

Wildfire simulator for prevention management: WildFire Analyst ®

(Santa Coloma de Farners, May 2015)

FOREST SCIENCES CENTRE OF CATALONIA
Generalitat de Catalunya
Departament d'Interior
PAU COSTA FOUNDATION ecología del fuego y gestión de incendios / fire ecology & management
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Course description

Title: Wildfire simulator for prevention management: WildFire Analyst®

Objective: The main objective of the course was planning, by using WildFire Analyst® simulator, strategic managing points (SMP) to integrate the big forest fires risk in the Mediterranean range.

Methodology: To reach the target of the *'Methodology for incorporating large fire risk into landscape management decision making*' and *'Large forest fire assessment and fuel management: into operational tools and integrated approach*', which are developed in FIREfficient project, were used.

Documentation: A dossier, which was based on the aforementioned methodology and *'Prevention of Large Wildfires using the Fire Types Concept'* guide, was made for the students.

Pupils: The pupils in the course were people in active employment and with jobs related to the course subject. The professional profile of the people who participated in the course included forestry engineers from the administration or private companies, researchers, students and teachers. All of them participated in the 'Survey – Pilot Sites' which was used to develop 3.3. task *'Training Standards in wildfire risk planning for land and fire planners*' from the FIREfficient project.

Course development

First day of the course

The course "Simulator of Forest Fires for prevention management: WildFire Analyst®" started on the last 6th of May in the Agricultural Training School from Santa Coloma de Farners (Girona), with around 20 pupils. This first day basically consisted of big forest fires theory and an introductory practice part of functioning and use of WildFire Analyst®. The imparted theory was the following:

- Forest fires introduction. Where were we? Where are we now? and Where are we headed?
- Generations of forest fires.
- Fire role in landscape ecology. Fire regime, intensities.
- Forest fires spreading basic patterns.
- Forest fires basic analysis. Field logic. Campbell PredictionSystem (CPS)
- WildFire Analyst® Introduction.

It is necessary to understand the forest fires history in our territory, which were the necessities in the past and which fire vision the society had and has, as well as understanding the fire part in the Mediterranean ecosystem and our forest mass, which kind of forest landscapes and structures we have depending on the fires intensity and performance.

It is also interesting to understand which are the different generations of forest fires we have had and have and see that them evolve in a parallel way to the landscape around us. There is no doubt it is essential to know that fires propagate in one way and not another, under which conditions they do it and be able to determine their motive force, in the same manner as Campbell language, to be able to get started in the forest fires analysis.

Finally, we will have to see how WildFire Analyst® simulator fits in this context, which are the purposes and solutions it can provide us with to be able to manage the forest fires in an efficient way.

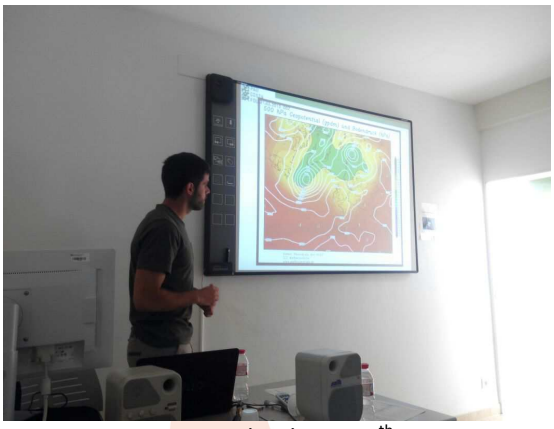

Image. Imparting the theory, 6th May 2015

Second day of the course

During the beginning of the second course day of "Simulator of Forest Fires for prevention management: WildFire Analyst®" course, a first theoretical part where we have finished introducing forest fire theory has been done in order to, subsequently, be able to apply it in the simulations. The content has been the following:

- Forest fuels. Delay time and fuel models (Rothermel, 1972) adapted in the Mediterranean ambit.
- Fire type of planning tool. Identification definition and methodology.
- Synoptic situations which generate BFF in Catalonia.
- Critic points versus strategic management points (SMP's) according to fire types.

The explained concepts have been applied through the study of different practise cases. On one hand, different synoptic maps have been studied (http://www.wetterzentrale.de/) from historical fires in Catalonia, which have allowed us to verify that the same synoptic situations can generate different surfaces scenes depending on the geography where the disturbance is placed, and in this way the different existent fires are produced.

Emphasise the importance that the historical fires and their propagation pattern has joined with the corresponding synoptic situations, as in this way the fire type from the studied zone can be obtained, which will be of great utility for the managing and planning of the territory as:

- It allows for the improvement of the extinguishing system efficacy.
- It allows for the improvement the forest resistance in front of the fire (SMP's localization).
- Through the analysis of the potentials it allows prioritizing the preventive interventions.

Two perimeters of historical fires have been also analysed and the propagation pattern they followed has been determined, besides of localising the different critical points which made the factors alignment rise according to CPS.

To end the day, the basis to get used to the establishment of scenarios in WildFire Analyst® and the different simulation methods which the program presents have been practised.

Image. Simulator Exercices, 13th May 2015

Third day of the course

In the third and penultimate day of the course, the experimentation by the students on WildFire Analyst® with all the process to make a simulation of the fire performance and verifying the efficiency of SMP's (strategic management points) has been prioritized, applying all the technical knowledge acquired the previous days.

At the beginning of the day a short presentation of the different simulators on the market and their use has been done, which stand out:

- Dynamic simulators (FARSITE and WildFire Analyst®).
- Static simulators (Flammap, Bheave Plus and Nexus).

Subsequently, we have proceeded with a presentation of the practise case with WildFire Analyst®: Vall-llobrega fire (Baix Empordà 2014) which belongs to a relief wind-driven fire and northern wind synoptic situation.

To create the scene the following resources have been facilitated to the assistants:

- Fire perimeter
- MDT
- Fuel layer
- Topographic map

The procedure which has been followed to prepare the simulator scene has been:

1st. Set data base routes (Data) and adjust the simulator extinguishing limits to be able to identify the extreme performances (Post-analysis).

2nd. Set the meteorological scenario (Weather scenario). The data registered on the day of the fire have been applied and the dead and alive fuel moisture has been estimated.

3rd. Make a free fire simulation.

4th. Determine SMP's. After seeing the fire performance without any management point there were attempts to determine different SMP's in shape format with ArcGis and later being able to apply the simulation scenario to validate its efficacy. Localising different SMP's has been done in base of the type fire and the synoptic situation applying the acquired knowledge on the previous sessions.

5th. Validate SMP's functionality. Once the two fire simulations have been obtained (with and without SMP's), keeping the meteorological conditions in both cases, the SMP's effect can be seen on the fire performance: reduction of spreading velocity (distance among isochrones), of the flame length and its intensity. So, a point facilitating the extinguishing mechanisms task is offered.
To finish the day we debated on the possible simulator advantages and disadvantages, such as:

- Facilitate the scenario creation
- Simulation rapidity
- Facilitate generating different outputs depending on the extinguishing capacity (flame length, intensity, propagation velocity, etc.)
- Inability to represent wind bracings
- Inability to represent secondary seats
- Work scarcity in a smaller scale.

In conclusion, it has been reported that the simulator results are not criterion of truth but instead are a tool to complement the technical task and help when taking decisions.

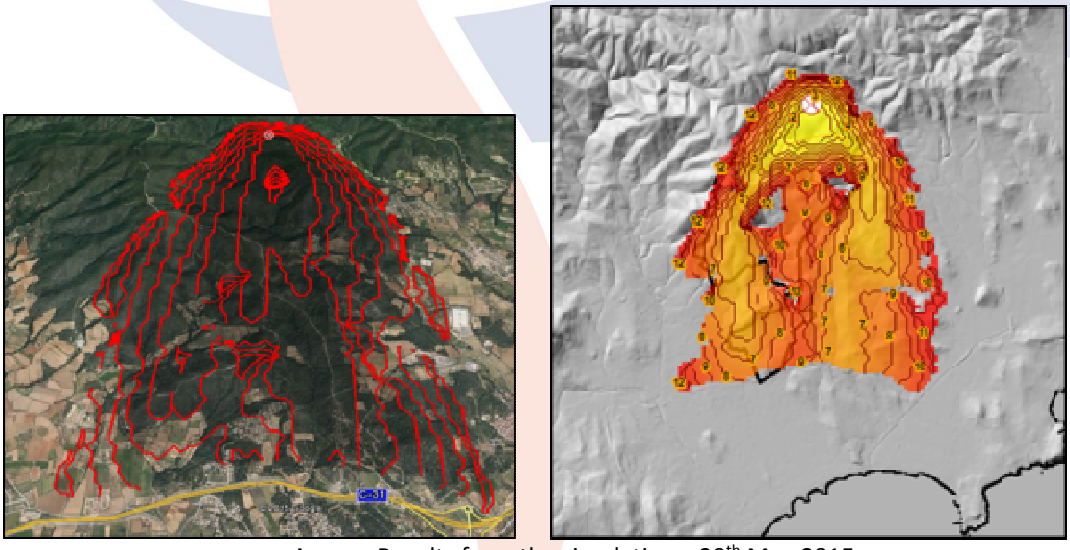

Image. Results from the simulations, 20th May 2015

Fourth day of the course

On the last day an excursion to Les Gavarres (mountain massif) was made to settle the knowledge and validate the obtained results in the classroom, with some of their technician as 'hosts' and participants in the course. Four study zones were visited to observe various planned infrastructures in the Forest Fires Prevention Plan of the priority protection perimeter of Les Gavarres. This plan is found in an advanced execution stage (80% executed) and the pre-extinguishing planned works are:

- Deceleration areas
- Security zones for the extinguishing works
- Pre-extinguishing structures
- Strategic management points according to the fires types
- Areas of low load fuel
- Water points

During the visit, the site of each of these works its execution and maintenance could be observed. To understand these pre-extinguishing technical components works, the excursion was complemented with a visit to Vall-llobrega forest fire (15/03/2014), the intensity of the fire in the different zones of the fire and the effects on the vegetation.

Image. First stop during the field trip, 27th May