

MONTCLIMA

CLIMATE AND NATURAL RISKS IN THE SUDOE MOUNTAINS

2nd SEMINAR

*“Strategies for Managing and Preventing
Forest Fires in the SUDOE Space”*

22 April 2021

TRANSFER REPORT

Inputs, good practices and conclusions

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PROJECT CO-FINANCED BY THE EUROPEAN REGIONAL DEVELOPMENT
FUND (ERDF) THROUGH THE 2014-2020 INTERREG SUDOE PROGRAMME

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INTRODUCTION

The **MONTCLIMA project: climate and natural risks in the SUDOE mountains** is a European project, co-financed by the European Regional Development Fund (ERDF) through the European cooperation Programme for Southwestern Europe (Interreg SUDOE).

Started in 2019, MONTCLIMA will run until December 2022 and aims to strengthen the resilience of the mountain territories of southwestern Europe in a transnational strategic framework based on the capitalization of projects successfully carried out on the prevention and management of climate-induced natural hazards (fires, droughts, floods and erosion).

Mountain areas are among the territories most affected by natural hazards and these risks are expected to increase due to the effects of climate change (more severe droughts, higher average temperatures, changes in precipitation regime). These risks know no administrative boundaries (e.g. fires that cross continuous forest stands) and require transnational coordination.

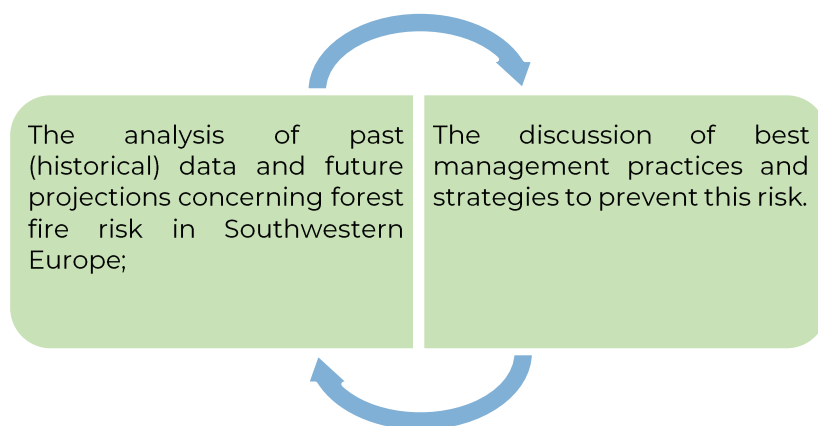
The focus of the project settles on the following strategic objectives:

- ▶ Capitalization of successful cases of forms of governance and practical initiatives for prevention and management of natural hazards;
- ▶ Design of a methodology for the development of a transnational strategic framework for risk prevention and management in SUDOE mountain areas;
- ▶ Test of the Transnational Strategic Framework in pilot territories for the project's natural hazards;
- ▶ Communication and dissemination of results and tools.

MONTCLIMA will develop an integrated strategy and methodology based on experience and demonstration through pilot projects that will be tested in SUDOE territories, relying for that purpose on a partnership that gathers competent bodies in the matter at state level, research centers and representatives of regional and local authorities from three countries.

This document aims to present the main inputs, good practices and conclusions of the **II Transnational Thematic Seminar** promoted in the scope of MONTCLIMA, named "**Strategies for Managing and Preventing Forest Fires in the SUDOE Space**", which took place on April 22nd 2021, in Leiria, in an online format.

This initiative, with an international vocation, counted on a diverse panel of experts from Portugal, Spain, Andorra and France, who focused, fundamentally, on two themes:



The range of speakers, diverse in nature, included representatives of research and knowledge generation entities, policy makers, authorities and civil protection agents, resulting in a truly enriching exchange of experiences. There was also room for participation by all stakeholders, experts and the general public, who, as part of the audience, had the opportunity to ask questions and comment on the presentations of the various speakers.

OBJECTIVES

In order to present the biggest challenges to the prevention and management of forest fire risks in the SUDOE space, the objectives of this II Transnational Seminar are the following:



To share knowledge / experiences concerning good practices on forest fire management and prevention strategies in the SUDOE space;



To contribute to forest fire risk management and prevention policies;



To deepen the pilot cases of the MONTCLIMA project, with special emphasis on those dealing with forest management and fire prevention.

THEMATIC STRUCTURE

The seminar "**Strategies for Managing and Preventing Forest Fires in the SUDOE Space**" was attended by a wide range of speakers from southwestern Europe, experts in the targeted theme. In line with the two main themes under discussion, the seminar was structured in **three thematic blocks** (of technical nature), with interventions of institutional nature:

- ▶ **Block 1:** Risk of Forest Fires in the SUDOE Space – Historical Data and Future Projections;
- ▶ **Block 2:** The Forest Management is the Key;
- ▶ **Block 3:** Round Table.

Block 1 focused on the approach to the forest fire risk in the SUDOE space - historical data and future projections. This was followed, in block 2, by a discussion on the importance of forest management as a key factor to face the forest fire risk, from the regional to the local scale. There was also an approach to methods and tools for identification and quantification of the risk, an explanation on surveillance, alert and early detection mechanisms of fires and, finally, the recognition of the role of society in the outbreak and prevention of fires. At last, block 3 brought together some experts in a round table, where some questions posed by the MONTCLIMA project team were first discussed, followed by some questions and comments from the audience.

Outlined below, are the themes of the event, including the details of the participation of the speakers.

- ▶ **WELCOME BY THE MONTCLIMA PROJECT**

Eva García-Balaguer (CTP - OPCC)

- ▶ **INSTITUTIONAL OPENING**

Diogo Mateus (Mayor of Pombal, Member of the Intermunicipal Council of the CIMRL)

Jean-Louis Valls (Working Community of the Pyrenees)

- ▶ **BLOCK 1: RISK OF FOREST FIRES IN THE SUDOE SPACE – HISTORICAL DATA AND FUTURE PROJECTIONS;**

Marc Castellnou (Forest Action Support Group – GRAF, Member of the fire brigade of the Catalan Government)

- ▶ **BLOCK 2: THE FOREST MANAGEMENT IS THE KEY**

- ▶ How to identify and quantify the fire risk level: risk cartography and analysis of past fires

Remi Savazzi (French agency for the defense of forests against fire – ONF, DFCI)

► How to plan the territory at a wide scale to reduce large wildfires

Carlos Guerra (CDOS – District Command for Relief Operations in Leiria)

► How to manage forest to reduce fire risk at a local scale

Noemí Palero (Forest Ownership Centre of Catalonia)

Diana Pascual (Pilot Case Study – CREAM)

► How to implement means for surveillance, alert and early detection

Antonio López Santalla (The Arbaria Project | Head of Service of the Forest Fire Defense Area of the Ministry for Ecological Transition and the Demographic Challenge – MITECO)

► The social factor as a trigger for forest fires

David Miqueleiz (Head of the environmental research group, Government of Navarra).

► **BLOCK 3: ROUND TABLE**

Carlos Guerra (CDOS – District Command for Relief Operations in Leiria);

David Miqueleiz (Head of the environmental research group, Government of Navarra);

Michel Castan (Municipal Councillor of Tardets-Sorholus, President of the Association of Municipalities Forest owners of Pyrénées Atlantiques);

Noemí Palero (Forest Ownership Centre of Catalonia);

Remi Savazzi (French agency for the defense of forests against fire – ONF, DFCI).

► **CONCLUSIONS AND ORIENTATIONS: LESSONS LEARNED**

Juan Terrádez Mas (CTP - OPCC)

► **INSTITUTIONAL CLOSURE**

Jorge Vala (Mayor of Porto de Mós, Member of the Intermunicipal Council of the CIMRL)

Seminar programme in annex.

INPUTS AND GOOD PRACTICES

The seminar was rich in the transfer of knowledge, experiences and good practices, a process from which several lessons can be learned. The following points present the key ideas (inputs and good practices) delivered by each speaker, organized according to the thematic structure of the event.

Welcome by the MONTCLIMA project

Referring to the fact that the Seminar coincides with the celebration of World Earth Day, the coordinator of the Pyrenees Climate Change Observatory of the Pyrenees Working Community, **Eva García-Balaguer**, recalled the central theme of the event - forest fire management and prevention strategies - and emphasized the project's contribution to increasing the resilience of the SUDOE mountains.

The nature of the MONTCLIMA project was highlighted, as a project based on the capitalization of success cases in order to improve the coordination, management and prevention of natural risks in the SUDOE mountains.

Regarding the work plan of MONTCLIMA, the transnational thematic seminars were highlighted as key aspects of knowledge transfer, framing this seminar as the second of a series of events that will be promoted throughout the implementation of the project and will address different natural hazards. Pilot actions were also mentioned as fundamental instruments of the project, as they will allow testing and experimenting with the methodologies and tools developed. In this context, MONTCLIMA is based on pilot cases and on the transfer of knowledge and experiences as a basis to improve the resilience of the SUDOE territory.

Institutional opening

Representing the Intermunicipal Community of Leiria, the Mayor of Pombal, **Diogo Mateus**, recalled the serious and destructive forest fires that hit the region in recent years, framing them in an unfortunate coincidence of factors, including climate change, the phenomenon of desertification and, to some extent, also the political choices from the point of view of forest management. He underlined, therefore, the importance of territorial cooperation in the search for best practices and management strategies that lead to greater resilience in the region.

Mentioned as good practices were the forest video surveillance and automatic fire detection system implemented in the Leiria region and prevention and defense actions developed by municipalities, in the light of the provisions of Portuguese legislation, particularly under the respective Municipal Forest Fire Defense Plans (PMDFCI). Also, as good practice, from the perspective of adaptive forest management to increase resilience to forest fires, mention was made of a reforestation plan with native plants that is being developed by the municipality of Pombal.

The population was seen as a key agent on the path to adaptation and increased resilience of the territory, in terms of prevention, clean-up and behavior change, in order to contribute not only to the protection of their lives, but also of their heritage (including forestry).

It is crucial to find a balance between socioeconomic, social and environmental issues, enhancing an interaction consistent with the sustainable development of the territory. In this sense, the MONTCLIMA project was recognized as an interesting project for sharing knowledge and tools for management and prevention.

Jean Louis Valls, director of the Pyrenees Climate Change Observatory of the Pyrenees Working Community, pointed out that natural hazards, such as forest fires, have no administrative borders. Indeed, collaboration, synergy and strategic cross-border alignment are of utmost importance. In this context, the POCTEFA project "PRINCALB - Prévention des incendies forestiers" was highlighted as a good practice, which should have allowed to break the administrative barriers to fight cross-border fires in a cross-border mountain area.

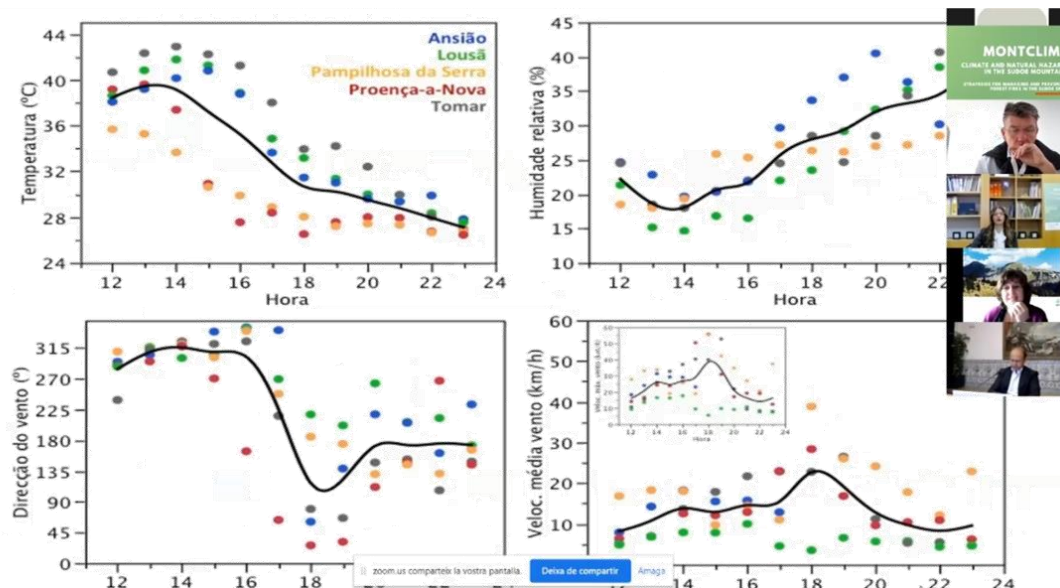
The mountain areas, the core of the project, were mentioned as being especially sensitive to natural and climatic risks, another reason for strengthening cooperation between the different territories in the prevention and management of these risks.

Block 1: Risk of Forest Fires in the SUDOE Space – Historical Data and Future Projections

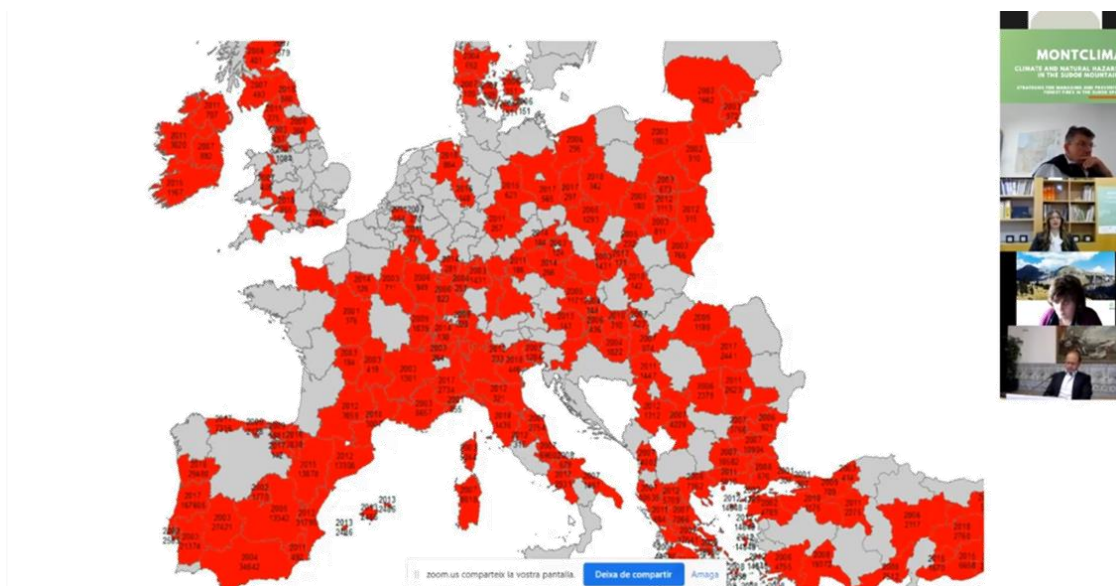
Marc Castellnou, Inspector and Head of the Forest Action Support Group - GRAF and member of the fire brigade of the Catalan Government, referring to the region that hosted the event, reported that the worst forest fire event recorded in recent years corresponds to the afternoon of October 15, 2017, in Portugal, with a burned area of approximately 274,000 hectares per day. This alarming situation will be a symptom that our forests are increasingly exposed to strong pressure and, in effect, more susceptible to fires of greater intensity.

It was explained that the risk of fire, according to projections associated with climate change, will tend to increase, particularly in southwestern Europe, where summers will tend to be warmer and winters rainier, with increased frequency of extreme events, conditions that are conducive to the production of biomass.

The "firestorm" that was generated in 2017 in Portugal was a totally anomalous event on the peninsula and will be the result of the climatic and socioeconomic changes that are already being felt in the territory.



The speaker explained that the fire regime is changing radically, with a tendency to become more unpredictable and extreme. In fact, this phenomenon works differently from what the population and civil protection agents were used to, generating erratic movements and unpredictable and devastating convective columns.



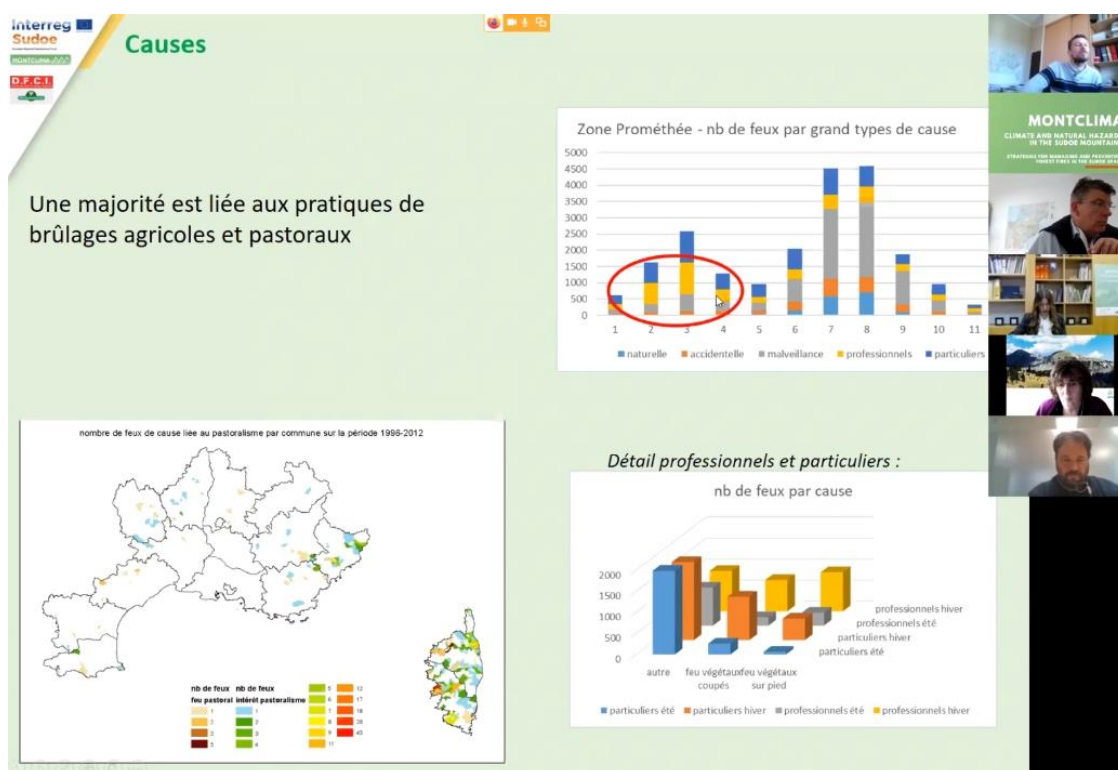
The context described points to a scenario of dual crisis facing Southwest Europe, namely climate change and land management. To face such challenges, the transition to adaptive territory management and, in general terms, to a circular economy will be the key aspect.

As a recommendation, the speaker pointed out that society must abandon the exclusively defensive view of fires and focus on the creative process of the new paradigm of extreme forest fires, which, arising from a new climatic context, are expected to be a future reality. Therefore, the focus on prevention should be reinforced, through the promotion of an adaptive management of the forest and the territory, where the focus on landscape diversity (avoiding homogeneity) will be part of the solution.

Block 2: The Forest Management is the Key

How to identify and quantify the fire risk level: risk cartography and analysis of past fire

Remi Savazzi, deputy director of the French Agency for the Defense of Forests Against Fire, based on statistical data, explained that the largest peak of fires in the Pyrenees coincides with the summer, followed by another coinciding with the late winter/early spring months. In this last peak, and regarding the causes of fires, the occurrences caused by individuals and professionals are particularly relevant.



The complexity of emergency response in mountainous geographic context was also emphasized, both in terms of equipment and intervention teams, often calling into question the cost-benefit of this response. Nevertheless, in firefighting, homes and transport and electricity infrastructures are priority elements for defense.

The identification and quantification of the risk level, with clear identification of the periods of higher incidence and the areas of higher risk, was highlighted as crucial for better forest management and fire prevention.

Météo France has collaborated with the French National Forestry Organization (ONF) to develop indexes for quantifying the level of risk and identifying particularly sensitive areas, where factors such as outbreak, spread and wind are considered. The index already developed (IEP) shows particularly favorable results with regard to winter fires.

How to plan the territory at a wide scale to reduce large wildfires

The District Operational Commander (CODIS) of the District Command for Relief Operations in Leiria, **Carlos Guerra**, began by reiterating the relevance of the subject under

discussion and presented a video regarding the Video Surveillance and Automatic Fire Detection System of the Leiria Region, representative of the installed capacity, in the territory, in terms of video surveillance technology and command support. This system, presented as a good practice, is characterized by three fundamental features:

- ▶ the video surveillance of rural areas in the Leiria region (in real time and accessible from mobile devices), covering 95% of the territory;
- ▶ the automatic detection of ignitions, through protocols installed in watchtowers distributed throughout the territory;
- ▶ the support to the operational decision in the firefight (the real images from different perspectives allow a clearer evaluation of the dimension and spread of the fire, supported by more timely and credible information).

The system (technological component) is complementary to traditional surveillance (human component), allowing access to "shadow" areas and, consequently, improving the management, response, and decision capacity when forest fires occur.





The currently installed system will be reinforced in the summer of 2021 with two mobile units (one operated by GNR - National Republican Guard and the other by ANEPC - National Authority for Emergency and Civil Protection). These mobile units include a vehicle and a drone with thermal capacity, which can be moved to the "theater of operations" in a fire situation.



Through the video it was also possible to see a set of additional good practices, complementary to the system, which are being carried out by the region of Leiria, namely the cleaning of fuel management strips (10 meters parallel to the roads), the incentive to plant more fire-resistant native trees (free distribution to the population), the reinforcement of the water points network and the use of prescribed burning.

In short, it was highlighted as a priority response to the risk of fire, the planning and focus

on prevention, allowing a faster intervention from the beginning of the occurrence.

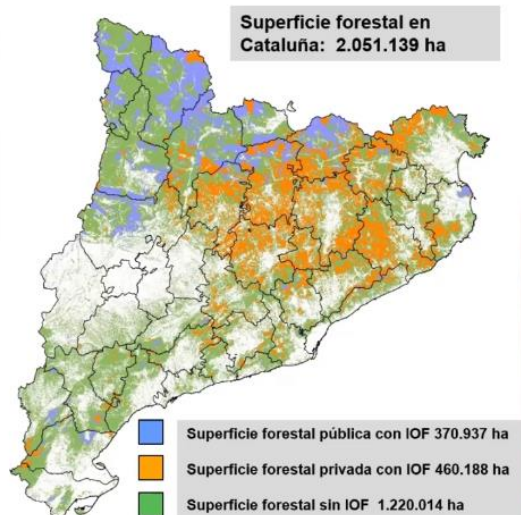
How to manage forest to reduce fire risk at a local scale

Noemí Palero, representative of the Forest Ownership Center of Catalonia (CPF), presented the ORGESTs, a guide with orientations for sustainable forest management in Catalonia project (Orientacions de Gestió Forestal Sostenible de Catalunya) and started her dissertation by framing the scope of intervention of the institution in the territory of Catalonia.

Catalonia, an autonomous community in Spain, has about the 65% of the territory occupied by forests and the 80% of its forests is under private ownership, as such, the management of forest areas is dependent on the involvement of owners and continuous creation of synergies with public entities. It is in this sense that the CPF develops its actions:

- ▶ in promoting sustainable forest management by means of Forest Management Instruments (FMIs) and advising on the practical application of forestry know-how;
- ▶ to technically and financially support the elaboration of Technical Plans for Forest Management and Improvement (TPFMI) and Simple Forest Management Plans (SFMP);
- ▶ applying for, processing and obtaining aids for sustainable forest management;
- ▶ prepare plans and projects for forestry exploitations, recover potentials affected by catastrophes and contract insurance policies against forest fires and civil liability;
- ▶ in promoting the constitution of forestry associations;
- ▶ in promoting forestry and the transfer of new technologies in the sector.

Situación forestal en Catalunya. El Centre de la Propietat Forestal (CPF)



Funciones del CPF

- Fomentar la gestión forestal sostenible de los boscos privados a través de:
 - Apoyo técnico a la redacción de instrumentos de ordenación (IOF).
 - Convocar, tramitar y resolver subvenciones.
 - Promover la constitución de asociaciones forestales.
 - Fomentar la silvicultura y la transferencia de tecnología en el sector forestal.



Currently, nearly 460,000 hectares of Catalan territory are associated with the SFMP and TPFMI management plans in private land. Thus, fire management planning is entirely dependent on forest management. The new forms of large-scale planning have allowed the creation of more effective forest fire prevention infrastructures, through the identification of strategic action points that improve the response in case of forest fire. This active forest management has been achieved by applying multifunctional management models specifically developed in Catalonia for the different forest formations that exist - the Sustainable Forest Management Guidelines of Catalonia (ORGEST) – developed in the last 5 to 10 years.

Multifunctional management models aim to create low vulnerability, resilient and stable forest structures over time, and to this end consider three predominant intervention goals, namely production, prevention and production-prevention. Since 2014, these models have been applied relating forest exploitation with wildfire prevention with results materialized in the territory as the most efficient silvicultural and silvo-pastoral exploitations. For their application, categorization classes of the existing situation are considered, as well as tabulated values of ideal situations, and during the planning process, variables such as, for example, climatological variables or the vulnerability of the crown canopies to the fire are analyzed. It is relevant to point out that the variables examined already consider the studied scenarios of climate change.

Instrumentos de planificación forestal

- Los instrumentos de ordenación forestal promovidos por el CPF son:
 - Planes técnicos de gestion y mejora forestal (PTGMF)
 - Planes simples de gestion forestal (PSGF)
 - Planes técnicos de gestion y mejora forestal conjunta (PTGMFc)



Planes conjuntos: Gestión del riesgo de incendio a nivel de paisaje



By applying these guidelines and multifunctional management models, with the support of the CPF, landowners will achieve harmonious planning in time and space, more productive holdings, promote the valuation of environmental services, and obtain dynamic models in synergy with the actions of the fire department, which will be an asset in the event of a catastrophe.

As part of the application of the functional management models previously presented in one of the five pilot cases of the MONCLIMA project, **Diana Pascual Sánchez**, expert at the Center for Ecological Research and Forestry Applications (CREAF), presented the developments regarding the pilot case of the forest massifs of the Montnegre and Corredor Natural Park. The intervention aims to reduce the risk of forest fire throughout the massif through two main actions: the application of the ORGEST in a Holm oak forest and the recovering of the agro-sylvo-pastoral mosaic (increasing resilience to fire).

The initial situation of the Holm oak forest was a dense and continuous forest, with a closed crown canopy and vertical and horizontal continuation of the combustible. The intervention consisted in a selective cut and scrubland clearing, with a reduction of about a 14% of the crown canopy cover, a 19% the number of trees per hectare and an 8% of the basal area. The main intervention was applied in the understory, where the 77% of the total scrubland cover and the 97% of the combustible bio volume was eliminated.



European Regional Development Fund




Gestión forestal en un encinar mediterráneo con alto riesgo de incendio en el macizo Montnegre-Corredor (Barcelona)

Cuantificación de la gestión forestal adaptativa aplicada

Situación inicial



Situación post-actuación



- Estructura del bosque:
 - ↓ 14% fracción cabida cubierta
 - ↓ 19% densidad
 - ↓ 8% área basimétrica
- Estrato arbustivo:
 - ↓ 77% recubrimiento matorral
 - ↓ 97% biovolumen combustible
- Vulnerabilidad al fuego de copas

Moderada antes y después

De estructuras B3-B9 a B14









MONTCLIMA
CLIMATE AND NATURAL HAZARDS
IN THE SUDOE MOUNTAINS
PREVENTING AND MANAGING AND REVERSING
CLIMATE CHANGE AND NATURAL HAZARDS






A detailed monitoring network was installed in the pilot case, where several variables are monitored along the project duration to evaluate if the adaptive forest management applied is key to reduce the fire risk in the area. The monitoring network is composed by eight permanent circular plots located in the area, where variables regarding vegetation (growth, health status, combustibility, vegetation water content) and regarding the physical characteristic of the site (soil water content, temperature and relative humidity) are collected. One of the main findings of the first year of monitoring has been the evolution of the vegetation water content or fuel humidity that is inversely proportional to the combustibility of biomass. Results showed that the humidity level has increased considerably with the adaptation measures applied in the management of the pilot area when comparing with the control area, where not management has been applied.

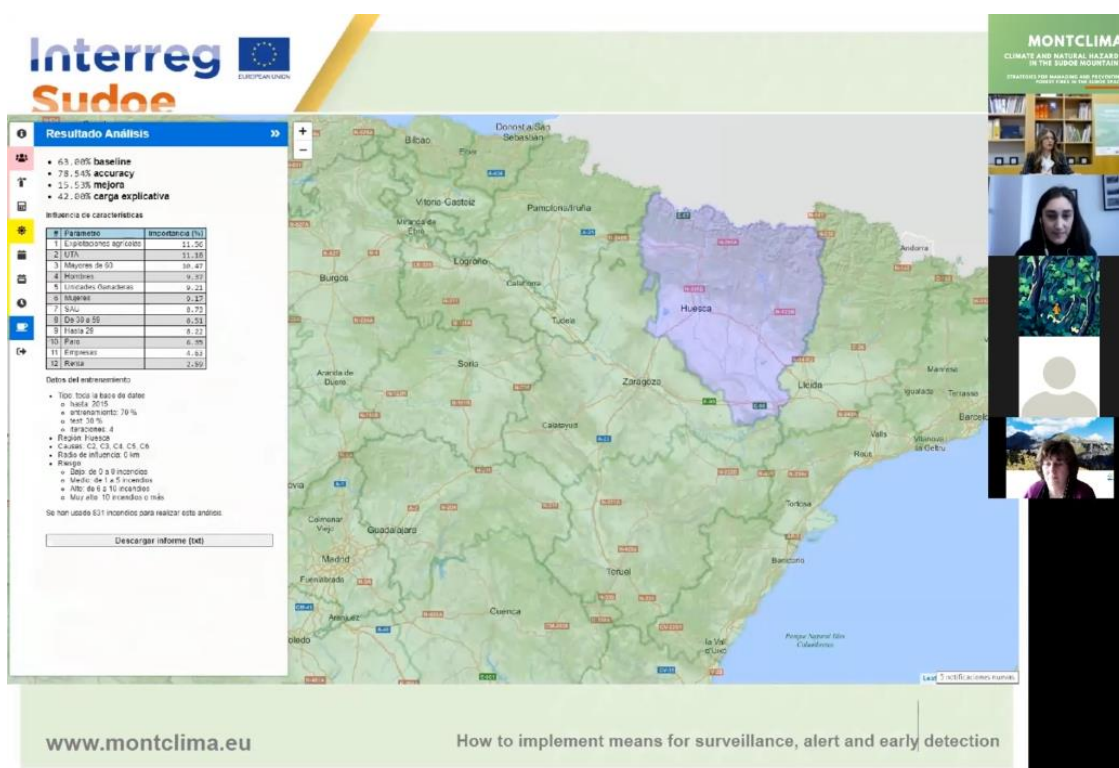
How to implement means for surveillance, alert and early detection

Antonio López Santalla, Head of Service of the Forest Fire Defense Area of the Ministry for Ecological Transition and Demographic Challenge (MITECO), emphasized fires as highly complex disturbance phenomena that generate countless impacts, highlighting the need to know the factors that lead to their occurrence.

There are several factors that lead to the occurrence of extreme events, one of them being the human factor. Research shows that 95% of forest fires have a human origin. In order to better understand this relationship, the project "*Arbaria: Inteligencia Artificial contra los incendios forestales*" emerged. By cross-referencing the history of fires and socio-economic indicators (statistical indicators, taxes, among others) it is possible to standardize information by territory, making it possible to take measures to prevent fires. In fact, through the studies implicit in this project, it is possible to find an explanatory

capacity of 40% of the fires that occur. In mountainous areas, this explanatory capacity increases up to 45% to 50%. Indicators such as the gender of the resident population, income, number of inhabitants, number and type of companies, or agricultural area, allow conclusions to be drawn about the causes of fires. The conclusions obtained also allow us to see those territories with similar morphologies, not rarely present different causes for the occurrence of fires depending on the characteristics of the population.

The cross-referencing of different indicators provides a knowledge base for the development of prevention strategies specific to each territory, such as working with the populations, in terms of training, or screening the territory in question.



Having said this, the study of socio-economic factors is considered crucial, since it allows, through the identification of fire causes, to act in a more effective way to reduce fire risk, adapt prevention actions to each territory, anticipate this type of events and reduce their consequences.

The social factor as a trigger for forest fires

David Miqueleiz, Head of the environmental research group of the Navarra Floral Police, addressed the importance of cross-border coordination for police and judicial investigation of forest fires.

Research is a fundamental tool in the prevention of this type of event, allowing conclusions to be drawn about the causes and motivations behind the events, enabling forestry policy actions to be planned, effective preventive measures to be implemented and mitigation measures to be developed. On the other hand, the investigation is the key factor in identifying a presumed author of the fire, allowing the responsibilities to be attributed.



The investigations carried out by the Environmental Research Group of the Navarre Floral Police reveal that the identification of the ignition source often makes it possible to determine the cause of the fire, with the human factor being identified as the main cause of forest fires. In the vast majority of cases, their occurrence is linked to agricultural or grazing activities.



The speaker also emphasized that although most fires are caused by human factors, it is necessary to distinguish between arsonists and pyromaniacs, since the former do it for profitable reasons and the latter do it for pathological reasons.

As an example of this type of investigation, the fire that occurred in February 2021 between France and Spain (Gipuzkoa and Navarra regions) was mentioned, which resulted in a joint investigation by the police and entities of the affected regions, highlighting the synergies of cross-border coordination.

Block 3: Round Table

As already mentioned, block 3 brought together some experts in a round table, where some questions posed by the MONTCLIMA project team were first discussed, followed by some questions and comments from the audience. From the answers and contributions of each of the speakers, we highlight the following.



When asked about the importance of the social factor in the outbreak of forest fires, David Miqueleiz mentioned that society is increasingly aware of issues related to territory and forest fires. However, he pointed out that the internalization of information by the population and the uncertainty it can generate is an important issue, since many times the territory is burned intentionally, but without a concrete cause or intention. In this sense, the purpose of maintaining certain mosaics of forest occupation seems to assume some relevance as a motivation and cause for the outbreak of forest fires.



Under the motto "*Fires are not fought, they are prevented*", and questioned about society's perception of this natural risk and its potential contribution to its prevention and reduction, **Carlos Guerra** highlighted the obligation of all those who have greater knowledge about the issue of forest fires (scientific community, policy makers, operators,

entities responsible for firefighting) to transmit knowledge clearly to the population. In the speaker's understanding, as an example, the younger populations that settle in the rural world tend not to have the appropriate level of knowledge and experience to develop certain potentially dangerous practices, such as burning and slash-and-burn, which can lead to uncontrolled fire, putting the territory at risk, even if unintentionally (negligently).

Indeed, he believes that it is crucial to carry out a massive information campaign, through the relevant entities, that includes the dissemination of information by tourism entities, the posting of information in strategic locations, and the training of the population in the implementation of the aforementioned practices.

The speaker also reinforced the need to take care of forests as an economic asset, since sometimes, if there is no income from a certain plot, the owners end up not maintaining and cleaning properly the territory concerned.

Finally, it was reinforced that is necessary to work with the populations to spread knowledge, experiences, and information in order to make them more aware of the importance of preventing forest fires, generating greater resilience.



Likewise, **Michel Castan**, when asked about the relevance of agricultural burning as a widespread cause of winter fires in mountainous areas, explained that this practice is widely used in grazing areas, given the low labor force in the sector. In order to avoid these events, and as a good practice shared with the participants, it was mentioned the organization of local controlled burning committees, with all stakeholders, where it is defined where, how and what will be burned. In this way, it is possible to take preventive measures, such as advance warning to the authorities that will be alert and can give a faster response to a possible fire.

Continuing, regarding the summer fires, the speaker emphasized the dissemination of information to tourists as the best way to prevent practices that could lead to forest fires, with tour operators playing a crucial role in this context, since in the case of the Pyrenees such fires are closely related to tourism activities.



In the round table, **Noemí Palero** was asked about the mechanisms and resources that the SUDOE territories have, or should have, to make forest management an ally in the prevention of large forest fires. Concerning this topic, the speaker explained that in order to affirm forest management as a solid base in the strategy of wildfire prevention, it is necessary to assume planning at landscape scale as a basic assumption. Thus, action should be prioritized, through a concerted strategy and management between the forestry and agricultural sectors, in order to join efforts to create landscapes organized in mosaics more resilient to fire risk. Planning should allow the identification of investment priorities, determining areas where efforts should be concentrated. So, taking Catalonia as an example, he explained that Priority Protection Perimeters (PPP) have been defined, coinciding with priority areas for risk prevention. In addition to these, "joint technical plans for forest management and improvement" have also been defined, at the scale of the forest massif, which allow the planning of fire prevention infrastructures adjusted to the entire target territory.



Lastly, **Remi Savazzi**, when asked about the distribution of investments in forest fire fighting and prevention in France and in the SUDOE territories, explained that the distribution is not identical for both priorities, but that he considers there is a balance relationship, at least in the French territory. However, he emphasized that only about one third of the investments are dedicated to prevention and the remaining two thirds are allocated to combat, noting that forest fires are often unpredictable, hence, in his perception, the greater allocation to combat. He concluded by stating that the means of prevention need to adapt to the emerging regime of fires, whose tendency, associated with climate change, is to become more unpredictable and extreme.



Institutional Clousure

Jorge Vala, Mayor of the Municipality of Porto de Mós, who closed the event on behalf of the CIMRL, emphasized the importance of this type of event and project for sharing good practices. Making reference to World Earth Day, when the seminar is being held, he highlighted the importance of joint work between regions, being essential for the political forces of the countries involved to implement a forest management project as common and as soon as possible.

There are no borders when it comes to forest fires, so there should be no borders when it comes to fire prevention, in order to make the SUDOE forests more resilient. The onus of the matter must focus on anticipating risks and always keep in mind the famous phrase *"Fires are not fought, they are prevented"*.

The speaker mentions the practices related to forestry, grazing and transhumance as essential in fighting forest fires, namely the cleaning of brushwood (also mentioning the scarcity of human resources for this purpose) and the use of prescribed burning plans (also to make up for the lack of human resources). It is necessary to prevent and not allow fires to break out.

Finally, he closes by reinforcing the idea of union and cohesion among the regions, in a perspective of joint policies, highlighting the need for greater strategic and operational alignment, in prevention rather than combat.

MAIN FINDINGS

As a result of the rich knowledge transfer carried out during the seminar, as evidenced by the synthesis of contributions and best practices already presented in this report, the following chapter summarizes the main key ideas and conclusions per presentation block.

Block 1: Risk of Forest Fires in the SUDOE Space – Historical Data and Future Projections

Climate change is one of the greatest challenges of the 21st century. The fire that occurred in Leiria (Portugal) on October 15, 2017 corresponds to the worst event recorded in recent years, resulting in about 274 thousand hectares of burned area per day. Situations like this one may increase in number and frequency, spreading to the rest of Europe, in particular to the SUDOE space, given its greater vulnerability. The occurrence of this type of event in recent years has become completely anomalous in Europe, unpredictable and extremely intense, manifesting itself in ways we were not used to, generating unpredictable and extremely powerful convective columns ("firestorms").

In southern Europe, climate change is being felt, above all, in the seasons of the year. The mild summers and harsher winters have given way to very hot summers and mild winters, but with a greater occurrence of extreme events, creating favorable conditions for more intense forest fires.

However, the rise of forest fire risks is not only the result of climate change, but also of territorial (non-) planning. The lack of territorial management was an attempt to preserve forests, in other words, not to intervene in the natural development of forests. Yet, the basic problem in Europe lies in the areas of greater forest density, where risk minimization measures should involve adapting these territories to the new contingencies and climatic conditions. The climate is changing, and the management and planning of the territory should follow this change, in a logic of adaptation, risk minimization and promotion of resilience.

Given the above premises, we conclude that society should take a more "creative" position regarding the prevention of extreme phenomena such as those that occurred in 2017. The diversity of the landscape and the multifunctionality of the forest (rather than monoculture) may be part of the solution to the problem, leading to greater resilience to forest fires.

Block 2: The Forest Management is the Key

Forest management is an unavoidable factor in the prevention and mitigation of forest fire risks. In the case of the Eastern Pyrenees, the risk of fire is related, above all, to the practices of forest burning, forestry and grazing. That said, human presence and infrastructures impose themselves as a challenge to combat the risks identified.

The typical fires in mountain areas have different characteristics from the common summer fires that affect more other territories, being more frequent between late winter and early spring. In these cases, the prevention measures adopted mainly involve the existence of first intervention patrols in strategic locations and the existence of easily accessible water points.

The analysis of fire history and the production of risk cartography can be part of the fundamental response for the prevention of these events. And at this level, specific tools have been developed, examples of which are indexes of outbreak and spread developed for mountain geographical context.

Territorial planning is a key factor in reducing large forest fires. Responding to this challenge, and bearing in mind the major fires of 2017, the Leiria Region (Portugal) has implemented a video surveillance and automatic fire detection system, covering about 95% of the territory of the 10 municipalities that make up the region. Controlling the entire region, this system allows the automatic detection of fire outbreaks, complementing, through a technological component, the conventional / traditional surveillance (human component). The installation of cameras in watchtowers spread throughout the territory enables a more extensive view of the fire from various angles, allowing a more effective, rapid and informed mobilization of the combat resources. In addition, this system will have, by the summer of 2021, two mobile operational centers, equipped with drones with thermal capacity, which can be mobilized on the ground in case of fire.

In addition, reinforcing the priority of prevention, complementary good practices are carried out, such as cleaning lanes for fuel management, enhancing the network of water points and resorting to the use of controlled fires in some key areas.

Another basic assumption of the fire prevention policy, and now taking the region of Catalonia as an example, is planning at the landscape scale, through a strategy and concerted action between the forestry and agricultural sectors, in a logic of joint efforts and prioritization of action. This should also be complemented by a more integrated planning, at the level of the forest massif, allowing the planning of fire prevention infrastructures better adjusted to the whole territory.

To support this planning, models are used that include meteorological variables - which allows the model to be adapted to the real situation - and also information regarding the vulnerability of the tree canopy to fires. The model carried out intends to culminate in the creation of forest structures of low vulnerability, resilient and stable over time.

Fires are, therefore, a disturbance phenomenon that generates profound impacts on forests. However, not only climate change provides conditions for the occurrence of these extreme events, but also the human factor must be taken into account. According to the ARBARIA project, there are socio-economic factors that make it possible to predict the occurrence of fires by identifying certain patterns. Thanks to this statistical information, it is possible to generate greater knowledge and demonstrate the relationship between fires and socio-economic factors, allowing an anticipated action in terms of prevention.

The importance of forest management at the local level is indisputable, but cross-border

coordination is also fundamental. The 2021 fire on the border between Spain and France highlighted the need for joint and concerted measures, not only in fighting but also in preventing forest fires, with the study of the motivations for fires (distinguishing between pyromaniacs and arsonists) being crucial to establish a reference framework that would allow relevant preventive measures to be established. In this context, a tool was implemented between the two countries - Sentinel 2 - which allows access to satellite resources to assess the extent of this type of fires. The use of this tool, combined with the coordination of cross-border police forces on the ground, provides knowledge about the causes and motivations of forest fires, making it possible to prevent other extreme events.

Block 3: Round Table

Society plays a key role in preventing forest fires, being increasingly aware of their risks and the importance of forest planning. The scientific community and other agents with responsibility for fire management and prevention have a key role in the clear and concise transmission of knowledge on prevention. It is also important to update the knowledge about old agricultural practices that have been replicated, often negligently, by new generations. Again, it is necessary to convey the need for conservation and maintenance of forests, in order to preserve ecosystems, but also the economic resources they represent. In this sense, it is important to reinforce and disseminate the principle that fires are not fought, they are prevented.

In the Pyrenees, summer fires are closely linked to tourist activities, and it is essential, for their prevention, to disseminate information to tourists about risky practices, with tour operators playing a crucial role in this context.

In the other hand, the winter fires, which have a more intense character, are fundamentally the result of burning practices in grazing areas. This is a practice widely used, given the scarce manpower in the sector. In order to avoid these events, local controlled burning commissions are organized in the Pyrenees, with all stakeholders, where it is defined where, how and what will be burned. In this way, it is possible to take preventive measures, such as giving advance warning to the authorities, who will be alert and can respond more quickly to a possible fire.

Forest management should be based on landscape level planning in order to prioritize action, and it is essential to proceed to a concerted management not only of the forestry sector, but also with the agricultural sector, in order to create mosaic landscapes, multifunctional and more resilient to the risk of fire. Planning should allow the identification of investment priorities and the determination of areas where efforts should be concentrated.

Although there is, in a transversal way in the SUDOE space, an investment in both prevention and firefighting, firefighting ends up, as a general rule, taking the biggest proportion of the investment. This fact may be explained due to the change in the fire regime which has been seen in recent years, marked by more unpredictable fires and more serious contours. Nevertheless, this change in the fire regime should also be the

main reason that justifies a greater commitment, concerted efforts and cooperation between territories for the prevention of forest fires.

FINAL CONSIDERATIONS

The second transnational seminar of the **MONTCLIMA project: climate and natural hazards in the SUDOE mountains** allowed the exchange of experiences, knowledge and good practices among the participants of the partner territories, regarding management strategies and forest fire prevention.

The seminar had a varied panel of speakers and stakeholders from the regions involved in the project (Andorra, Spain, France and Portugal), including representatives of research and knowledge generation entities, policy makers, authorities and civil protection agents.

The first presentation exposed the importance of historical data for future projections in the combat and mitigation of forest fire risks. In this context, we must refer the devastating 2017 fire in Leiria (Portugal), a completely anomalous event in the peninsula and that will be the result of the change in the fire regime that has been registered in recent years in Europe. Considering future climate projections, this type of event could spread to southwestern Europe, making it crucial to align strategies and actions in order to provide the territories with greater resilience and thus act preventively, minimizing the risk and its consequences.

Forest management becomes the key to fighting fires, and several tools and best practices were presented in this context, including the use of cartography and analysis of the fires historical data, video surveillance, creation of low vulnerability forest structures, forest management at the landscape scale, promotion of multifunctionality of the forest, analysis of socioeconomic factors, and consideration of the human factor.

Despite the diversity of methodologies and projects implemented, it seems unanimous that prevention should involve the dissemination of information through the competent entities, be they political decision-makers, firefighting operators or the scientific community, in order to raise awareness and inform the population of practices that can enhance and cause forest fires.

The modification and intensification of forest fires is a consequence of climate change, which does not recognize borders. Therefore, the definition of a concerted strategy between regions is primordial, in a manner that makes it possible to implement actions to prevent these events, because *"forest fires are not fought, they are prevented!"*.

ANNEX

MONTCLIMA

CLIMATE AND NATURAL HAZARDS IN THE SUDOE MOUNTAINS

STRATEGIES FOR MANAGING AND PREVENTING FOREST FIRES IN THE SUDOE SPACE

22 APRIL 2021

ONLINE SEMINAR

WWW.MONTCLIMA.EU

PROJECT COFINANCED BY THE
EUROPEAN REGIONAL
DEVELOPMENT FUND (ERDF)

OBJECTIVES

This thematic seminar presents the main challenges and advances in the prevention and management of the forest fire risk considered in the SUDOE space. Its general objectives are:

- To share knowledge / experiences concerning good practices on forest fire management and prevention strategies in the SUDOE space;
- To contribute to forest fire risk management and prevention policies;
- To deepen the pilot cases of the MONTCLIMA project, with special emphasis on those dealing with forest management and fire prevention.

PARTNERS



PROGRAMME

Portugal time (WEST)

09:00 - 09:05 WELCOME BY THE MONTCLIMA PROJECT

Eva García-Balaguer (*CTP - OPCC*)

09:05 - 09:30 INSTITUTIONAL OPENING

João Catarino (*Secretary of State for Nature Conservation, Forests and Spatial Planning*)*

Diogo Mateus (*Mayor of Pombal, Member of the Intermunicipal Council of the CIMRL*)

Jean-Louis Valls (*Working Community of the Pyrenees*)

09:30 - 10:00 BLOCK 1: RISK OF FOREST FIRES IN THE SUDOE SPACE - HISTORICAL DATA AND FUTURE PROJECTIONS

Marc Castellnou (*Forest Action Support Group - GRAF, Member of the fire brigade of the Catalan Government*)

09:50 - 10:00 Q&A Session

10:00 - 11:20 BLOCK 2: THE FOREST MANAGEMENT IS THE KEY

10:00 - 10:15 How to identify and quantify the fire risk level: risk cartography and analysis of past fires

Remi Savazzi (*French agency for the defence of forests against fire - ONF, DFCI*)

10:15 - 10:35 How to plan the territory at a wide scale to reduce large wildfires

Carlos Guerra (*CDOS - District Command for Relief Operations in Leiria*)

10:35 - 10:55 How to manage forest to reduce fire risk at a local scale

Noemí Palero (*Forest Ownership Centre of Catalonia*)

Diana Pascual (*Pilot Case Study - CREAM*)



10:55 - 11:10

How to implement means for surveillance, alert and early detection

Antonio López Santalla (*The Arbaria Project | Head of Service of the Forest Fire Defence Area of the Ministry for Ecological Transition and the Demographic Challenge - MITECO*)

11:10 - 11:20

The social factor as a trigger for forest fires

David Miqueleiz (*Head of the environmental research group, Government of Navarra*)

11:20 - 11:30

Q&A Session

11:30 - 11:40

COFFEE BREAK

11:40 - 12:40

BLOCK 3: ROUND TABLE

Carlos Guerra (*CDOS - District Command for Relief Operations in Leiria*)

David Miqueleiz (*Head of the environmental research group, Government of Navarra*)

Michel Castan (*Municipal Councillor of Tardets-Sorholus, President of the Association of Municipalities Forest owners of Pyrénées Atlantiques*)

Noemí Palero (*Forest Ownership Centre of Catalonia*)

Paulo Batista dos Santos (*Mayor of Batalha, Vice-President of the Intermunicipal Council of the CIMRL*)

Remi Savazzi (*French agency for the defence of forests against fire - ONF, DFCI*)

12:25 - 12:40

Q&A Session

12:40 - 12:50

CONCLUSIONS AND ORIENTATIONS: LESSONS LEARNED

Juan Terrádez Mas (*CTP - OPCC*)

12:50 - 13:00

INSTITUTIONAL CLOSURE

Jorge Vala (*Mayor of Porto de Mós, Member of the Intermunicipal Council of the CIMRL*)

* to be confirmed

To participate in the Seminar register [HERE](#).

