

This quarterly publication addresses environmental education in the face of fires, with news from the SenForFire project and stories about the science of fire. More than a journal, it is an invitation to care for the Earth.

SenForFire **NEWS**

FIRE FIGHTING TECHNOLOGY

Journal of the SenForFire project for the development of sensor networks for the prevention and early detection of forest fires.

APRIL-JUNE

02

THIS ISSUE:

*From rain to fire
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PREScribed BURNING

You may have heard the term 'prescribed burn' used incorrectly as a synonym for 'controlled burn.' However, they are not exactly the same thing. **SenForFire Interreg Sudoe** carries out prescribed burns to evaluate the performance of its sensors in the field. These burns are carefully planned and controlled fires, carried out in specific areas under precise conditions of temperature, humidity, and wind. Their purpose is to reduce excess forest fuel, preserve fire-adapted ecosystems and prevent fires. Controlled burns, on the other hand, are fires that are managed to prevent them from getting out of control, although they are not always planned with the same level of detail as prescribed burns. In summary: all prescribed burns are controlled, but not all controlled burns are prescribed.

FROM RAIN TO FIRE

In recent years, climate change has become increasingly drastic, a phenomenon coined by the scientific community as 'hydroclimatic whips': extreme fluctuations in the climate capable of destabilising ecosystems and generating unexpected effects. These abrupt variations cause intense alternations between droughts and floods, which have a significant impact on both ecosystems and society.

Recent rainfall has highlighted the increasing frequency of these extreme weather events. Although we tend to associate heavy rainfall with flooding, there is another less obvious but equally worrying risk: the increase in combustible material that promotes the spread of forest fires.

At first glance, it may seem contradictory that rain contributes to fires, but the two phenomena are closely related. Heavy rainfall promotes rapid vegetation growth in forests and rural areas, creating a dense blanket of grass, shrubs and plants. However, when the dry season arrives, all this vegetation withers and becomes highly flammable fuel. This cycle is exacerbated when periods of heavy rainfall are followed by months of extreme heat and drought, conditions that significantly increase the risk of forest fires.

To mitigate this threat, it is essential to implement landscape management strategies that reduce the accumulation of dry vegetation. Actions such as weed control, removal of dead branches and reforestation with more fire-resistant species can make a big difference. In addition, conserving soil moisture and preventing erosion helps maintain ecological balance and mitigate the effects of climate change.

The challenge is undeniable, but prevention and environmental education can be key tools in minimising risks. As climate change intensifies, awareness and collective action become essential to protect our ecosystems and, ultimately, our future.



SENSFORFIRE ARRIVES IN CHILE

With the aim of strengthening the fight against forest fires, researcher Javier Madrigal, from the Spanish National Research Council (CSIC), presented the progress of the **SenForFire Interreg Sudoe** project at the Río de los Cipreses National Reserve in the O'Higgins Region of Chile. This innovative system uses low-cost wireless sensor networks for early fire detection, a technology that has proven highly effective in tests carried out in Spain.

Javier Madrigal's visit was part of a scientific collaboration with the E-CIFA group at the Federico Santa María Technical University and the National Forestry Corporation (CONAF). During the international seminar From Science to Action, the Spanish expert presented his findings on the flammability of different plant species and the role of volatile compounds in the spread of fire.

As Madrigal explained, one of **SenForFire**'s greatest contributions is its ability to protect areas that are difficult to access and urban areas that are vulnerable to fires. His presentation generated great interest among Chilean park rangers, environmental managers and forest firefighters, who see this technology as a key tool for improving prevention and emergency response.

Given the positive impact of the project, the **SenForFire** consortium is evaluating the possibility of expanding its research to other regions with a Mediterranean climate. This would foster new international collaborations and strengthen forest fire prevention and control strategies in Chile, as well as in other countries in America and Europe.



AREA LOCATION

Planning a prescribed burn should include a detailed description of the area to be treated, considering factors such as orientation, slope, and vegetation type. The usual climate of the area should also be taken into account, as it influences the optimal conditions for burning. In addition, it is necessary to identify and map the work area, specifying boundaries such as municipal boundaries, properties, infrastructure, roads, and critical points.

FIRE DYNAMICS AND OBJECTIVES

It is essential to clearly define the objectives of the burn (such as reducing combustible material or improving habitats) and to predict the behaviour of the fire. This includes determining specific parameters such as flame height, spread rate and how you want the fire to progress. These details allow the burn to be adjusted to the established objectives, ensuring that the fire is controlled at all times.

PREPARATION AND SAFETY

Planning should also include creating a firebreak around the area to prevent the fire from spreading to other areas. In addition, it is essential to organise human and material resources, establishing clear roles for each team member and defining access and exit routes. An effective communication system is crucial, along with a contingency plan in case the fire gets out of control.



INNOVATION AND EUROPEAN ALLIANCE

At a critical moment for climate change management, Barcelona has become the setting for a key meeting for the future of forests in south-western Europe. The city hosted the 2nd Follow-up Meeting of the **SenForFire Interreg Sudoe** project, an initiative that combines science, technology and international cooperation with a common goal: to prevent and manage forest fires more effectively.

During two days of intense work, representatives from universities, research centres, public administrations and technology companies from Spain, Portugal, France and Andorra presented promising advances. At the centre of the conversation were smart sensors, networked communication systems and the use of cloud software to anticipate and control fires before they become an uncontrollable threat. 'The real challenge is not only to develop advanced technology, but to make that technology useful to those on the front line,' explained Esther Hontañón, a researcher at the Spanish National Research Council (CSIC) and project coordinator. That is why **SenForFire** has involved forest brigades, local councils and cultural organisations in the design of its tools from the outset.

Among the most notable developments are MEMS sensors, capable of detecting changes in gases, particles, humidity and wind, which allow risk maps to be created in almost real time. These devices, connected via wireless networks, feed a digital platform that can simulate the spread of fire, issue early warnings and provide relevant environmental data to the public.

But technology needs validation. That is why the project has carried out pilot tests in real conditions, from wind tunnels at the INIA-CSIC in Madrid to controlled burns in León and Ávila, in collaboration with the Forest Fire Reinforcement Brigades (BRIF). The results are helping to fine-tune the prototypes and define the final devices that could be applied throughout the SUDOE region (south-western Europe).

More than just a technical meeting, the Barcelona event was a clear demonstration of how technology, when properly targeted and accompanied by real cooperation, can become a powerful tool against forest fires. Because today, more than ever, caring for our forests is a shared responsibility between science, institutions and citizens.



The icon of the Interreg Sudoe programme, under the slogan 'Cooperation is in your hands', highlights here news directly related to the **SenForFire** project.



SenForFire Coordinator: Esther Hontañón | esther.hontanon@csic.es | Institute of Physical and Information Technologies ITEFI. Spanish National Research Council CSIC. Madrid.

SenForFire Communication Coordinator: Macarena Parejo | macarenapc@unex.es | Image and Communication Office. University of Extremadura UNEX. Badajoz.

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**Interreg
Sudoe**



Co-funded by
the European Union



PRÓXIMOS ENCUENTROS

9º CONGRESO FORESTAL ESPAÑOL (9CFE)

Dates: 16-20 June

Location: Gijón, Asturias

More information:

9cfe.congresoforestal.es

Organised by the Spanish Society of Forestry Sciences (SECF), this event will bring together more than a thousand professionals from the forestry sector, including researchers, technicians, forest owners and managers. The chosen theme is 'Forest intelligence: driving alliances in territories', highlighting the importance of managing our natural heritage through innovative solutions. Topics such as digitalisation, climate change and the bioeconomy will be addressed. INIA-CSIC will participate as a speaker, presenting **SenForFire**.

7th EXPERIMENT@ INTERNATIONAL CONFERENCE (EXPAT'25)

Dates: 3-5 September

Location: Horta, Faial Island, Azores (Portugal)

More information:

expat.org.pt/expat25

The Expat'25 conference is a high-level international event that brings together experts from various scientific disciplines. This edition will feature a special session entitled 'Innovation in Forest Fire Risk Management (IFFRM'25)', in which representatives from the University of Extremadura (UEX), the Barcelona Institute of Microelectronics (IMB-CSIC) and the Institute of Physical and Information Technologies (ITEFI-CSIC) will participate as part of the **SenForFire** project.



MORE INFORMATION