

NOVEMBER 2025

MY PLANET

by The Navigator Company

40 VOICES
to make sense of fire

António Arnaut António Loureiro António Nunes António Amorim António Salgueiro Aswin Thomas Carlos da Câmara Carlos Lobo Carlos Magno Clemente Pedro Nunes Dina Duarte Domingos Xavier Viegas Duarte Cordeiro Fábio Silva Filipe Duarte Santos Francisco Gomes da Silva Gary Morgan Gonçalo Almeida Simões Henrique Pereira dos Santos João Baeta Henriques Joaquim Sande Silva José Miguel Cardoso Pereira José Ribau Esteves Júlia Seixas Luciano Lourenço Luís Mira Luís Sarabando Maurício Teixeira Marques Miguel Boó Miguel Freitas Miguel Miranda Nuno Calado Nuno Guiomar Otília Correia Paulo Fernandes Paulo Pimenta de Castro Pedro Bingre do Amaral Tiago Centeno Victor Louro Vítor Poças

MY PLANET

Nº16

Published and coordinated
Direção de Comunicação e Marca

Director
Rui Pedro Batista

Design
Ray Gun / Creativity Worldwide

Content
Key Message Comunicação Estratégica

Proprietor/ Published by
The Navigator Company

Adress and editorial office
Av. Fontes Pereira de Melo, 27. 1050-117 Lisboa

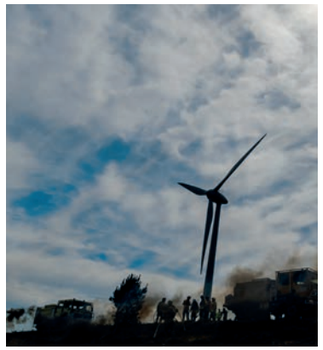
Publication
Tri-monthly

Distributed free of charge

BCSD PORTUGAL
CONSELHO EMPRESARIAL PARA O DESENVOLVIMENTO SUSTENTÁVEL

apce
ASSOCIAÇÃO PORTUGUESA COMUNICAÇÃO DE EMPRESA

08
Portraits of fire
Portugal joins the new age of fires – longer, fiercer and increasingly hard to control.



28
Interview
"We need a collective response to stop the advance of large-scale fires." Gary Morgan, international fire management specialist



40
Risk factors
Unmanaged land is the greatest risk factor – it leaves the landscape vulnerable, with nothing to hold back fires.



YOU CAN ALSO JOIN US AT:

facebook.com/myplanet.pt

instagram.com/myplanet.pt

62
Interview
"It's the landscape that creates the fire." Paulo Fernandes, researcher at UTAD

68
The answers exist
Active management, scale and cooperation: when woodlands are organised, fire loses its grip.



78
Prevent and protect
Technology is reshaping how we prevent and fight fires.

114
When fire robs woodlands of their value
At RAIZ, research has demonstrated: burnt wood is lower in quality.



72
AFOCELCA
Set up by the paper industry, this joint force protects forests and helps to fight fires up and down the country.



The data presented in this edition refers to the period for which data was available at the close of this edition (31 August 2025), from official Portuguese sources (ICNF and SGIFR). In occasional cases, in particular data from European bodies, data up to September was considered. In all cases, the reference period is indicated in each article.



By João Lé
Executive Director
of The Navigator Company

A new reality: the future of fire

Year after year, Portugal faces an increasingly tough challenge in tackling wildfires. Fire that ravages what we can see – scrublands, agricultural crops, and forests – and what we can't see – the soil, biodiversity, the balance of ecosystems, people's peace of mind, and economic value. These fires burn in Portugal, in Europe, around the world. And whilst this is a pattern that stubbornly repeats itself, something is clearly changing: fires are getting longer, fiercer, and more unpredictable.

Science calls them sixth-generation fires. This special edition of My Planet responds to the urgent need to make sense of this new reality. But above all, it reflects our awareness that, in order to find new ways forward, we need to listen, debate, and share knowledge.

So, we decided to bring together some forty researchers, experts, and professionals in the sector, who make their own clear, distinctive, and independent contributions. We also include reports featuring first-hand accounts from individuals working to assess the situation, and also the answers that already exist, but where adoption on the ground has been frustratingly slow.

On behalf of Navigator, I would like to thank all those who agreed to take part in this edition for being so generous with their time and ideas.

In one of the interviews we publish, Gary Morgan, whose international experience of fire management is both vast and uncontested, draws attention to the vital role of informed debate, in words that ring true: "A lot of research has been done, but we need more communication to share what we've learned".

Sharing knowledge is part of The Navigator Company's purpose and was also the driving force behind the Eucalyptus Forum we organised over the course of 2024, bringing together more than 120 people from sectors ranging from academe and researchers to local government, NGOS, forestry producers' associations, industry and media professional, promoting a fact- and science-based debate on the future of Portugal's forests.

Portugal clearly understands that urgent measures are needed.

Twenty twenty-five has again reminded us of how much needs to be done: less ignitions, but a larger burnt area, fires that are more extreme, longer and harder to predict. Above all, these are fires that reflect an abandoned landscape, where woodlands are unmanaged and fuel accumulates. They reflect a countryside which is depopulated and ageing, less able to take action.

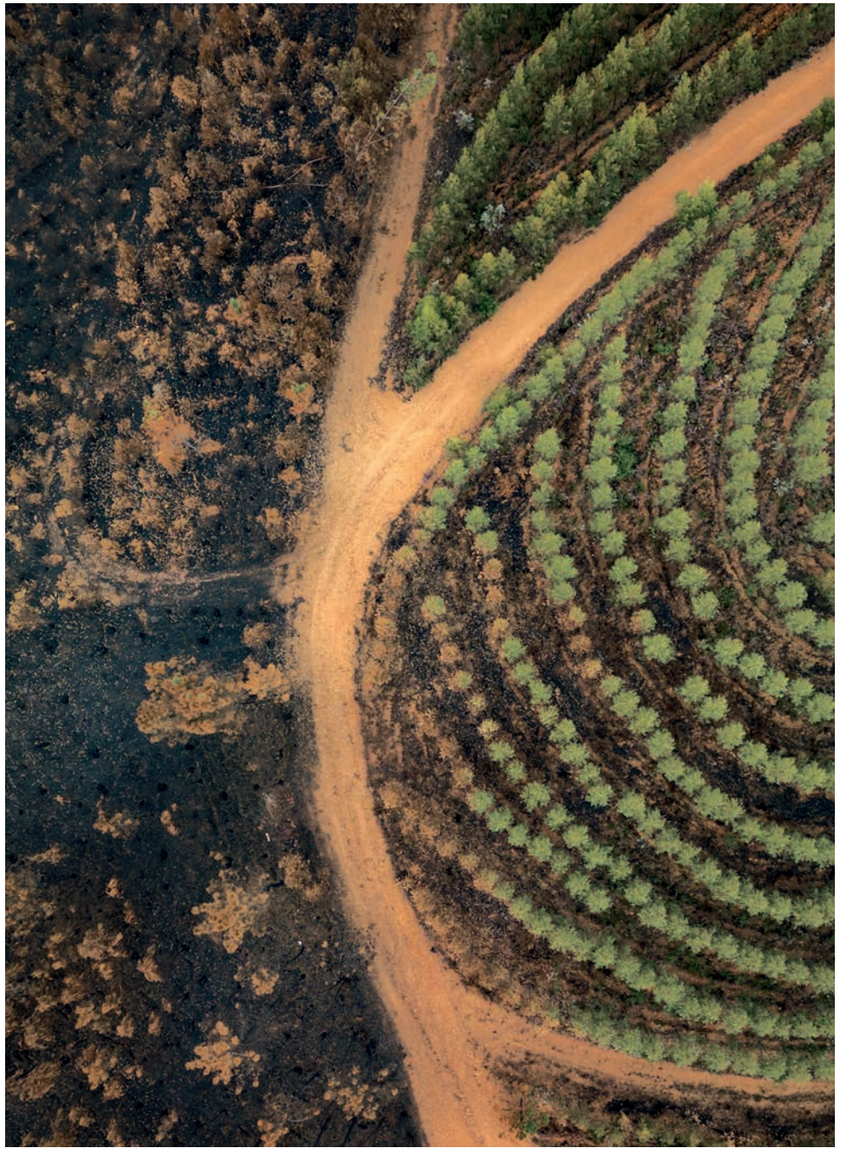
Wildfires are fires that get out of control. And while we can't change the lie of the land or the weather, we do have the power to shape how land is occupied and how this evolves. Whilst extreme weather is part of the problem, unmanaged land is what really fuels fires. I have experienced this reality at first hand since 1990, first in the field, in hands-on fire-fighting and coordination of aerial resources, and later in forest management in Portugal and Mozambique. This experience has taught me a key fact: we will never be able to eliminate fire altogether, but we can learn to manage it, reducing risks and creating more resilient landscapes.

It is essential to implement a planning culture that starts even before forestry projects are planned and executed, that provides for continuous prevention in order to manage risk, limit losses from fires and give fire-fighters the best chances of success. As we have sadly seen, it is no use creating infrastructures and mosaics if these are not harnessed for effective prevention and fire-fighting.

I am reminded of the words I heard a few years ago from one of the guest contributors to this edition: "you stamp out small fires with your feet", adding that large-scale fires are put out using your head. There is no substitute for planning and land management, and, out in the field, vigilance, accurate warnings and a rapid response are the best way of stopping fires in their tracks.

This of course is the model adopted by AFOCELCA, the Navigator and Altri joint venture working to prevent and fight wildfires. Its procedures are designed for mobilisation in two minutes and arrival at the theatre of operations in less than 30 minutes. This is an approach that demands professionalism (and professional development), planning and coordination, monitoring, bravery and concern for safety, as well as drawing on know-how to anticipate needs and manage resources.

Fire-fighting, however, is the last resort. The phase we want to avoid reaching. We have to take action earlier and, in particular, we need action based on fact, and not on beliefs or myths. It has been politically convenient to scapegoat eucalyptus. Once again, the data for 2025 (but also for the last 30 years) shows that eucalyptus is far from being Portugal's most fire-prone form of forest cover.



Blaming eucalyptus for fires has been a way of diverting attention from the real problem: depopulation of the countryside, unmanaged land and the collapse of the rural economy. By taking this road, we have repeatedly misidentified the cause, with the result that the solutions fail to work.

Technical and scientific know-how is clear: fire is blind to species, it chooses landscapes.

Portugal's forests are one of our greatest strategic assets. They sustain an economic sector that represents hundreds of thousands of jobs up and down the country and exports with a high level of value added. They are key to Portugal's ascendancy as an innovator in the bioeconomy, as well as to pursuit of the goals of carbon neutrality. We should recall that, in Europe, one in every sixteen euros generated comes from the forest economy. A clear sign that the sector is not a problem, but instead part of the solution.

In short, the public debate needs to be more clear-sighted. The real solutions start from a correct reading of the facts and honesty in pointing to the causes. The solutions demand policies to support the countryside, incentives for combined and ongoing management for woodlands fragmented into myriad smallholdings, economies of scale and an inclusive approach which, instead of discriminating against species, promotes sustainable practices. We will need to work on prevention and accord professional status to forest fires-fighters, harness technical and scientific know-how and apply it in the field, with model projects that can easily be replicated.

More than plans and needs assessments, we need persistent, informed and joined-up action to make Portugal's forests a productive, resilient and safe asset. Management, not the species, will be what decides the future of fire.

PORTRAITS OF FIRE

The fires that burn today are not the same as in the past. They are fiercer, longer and more devastating. Science calls them sixth-generation fires. A new age of events that transform landscapes, threaten land and livelihoods and challenge strategies. Portugal and the rest of the world are facing a global phenomenon that demands an urgent response, innovation and collective action to protect forests, communities and the future.



When the face of fire changes

From natural phenomenon to global threat: Portugal's experience reflects a wider trend that is changing how the planet burns.

In recent years, the increased frequency of extreme weather events, combined with drastic changes in land use and socio-economic dynamics, has transformed what we thought of as the "fire season" into a longer lasting phenomenon, which is harder both to predict and to combat. On a global scale, the burnt area and the intensity of fires has been growing. From California to Australia, from Amazonia to Spain, Greece and Italy, the planet seems to be burning at a new pace.
And Portugal is no exception.
This is what the figures for 2025 show: up to the end of August, although the number of events is down on the average for the past decade, the burnt area was the largest since 2015:
254 thousand hectares - almost double the area burnt in all of the previous year. In relative terms, there were 23% less fires, but the burnt area was 259% greater, which confirms a worrying trend: we are having less fires, but they are increasingly destructive - fiercer, faster and more difficult to contain.

The age of sixth-generation fires
These are what are called sixth-generation fires, able to alter the meteorological conditions around them, generating firestorms and releasing so much energy that they create their own convective clouds, lightning, wind shear and new ignitions. Weather ceases to be just a cause - it is also becoming a consequence.
In an interview with the Spanish newspaper El Periódico in late 2017, Marc Castellnou, an international expert in forest fires, used the example of Portugal to explain the virulence of this type of fire: "Our capacity to extinguish fires stands at 10.000 kilowatts per metre, and in the fire in Portugal, in June, the fire spread at 138,000 kilowatts per metre".
Climate change, "which places forests under stress" and creates the conditions in which energy is released much faster, is what lies behind these extreme fires, he told the newspaper, concluding that there is little that can be done at the height of the blaze, it is essential to get everyone out of the danger zone (civilians and fire fighters) "until conditions improve".
But we cannot afford to sit back and do nothing: before the fire happens, the scope for action is greater: "We have to manage forests, create a bioeconomy and keep people in the countryside", Marc Castellnou concludes.
Sixth-generation fires are a relatively common phenomenon in Canada or Australia, where there are vast land masses, but they are now starting to be seen also in smaller regions, such as the Iberian Peninsula. In Portugal, according to data from SGIFR (Integrated Wildfire Management System), up to 31 August 2025, on average, 68% or the burnt area and 92% of large fires (≥ 5 000 ha) are the result of ignitions on critical days, when the meteorological hazard is classified as "maximum", "extreme" or "exceptional".
The result is a new pattern of fire events - what experts call the 'fire regime'. Fires are more volatile and less predictable, with large fires occurring more frequently. Only 0.5% of fires recorded up to 31 August 2025 were large in size (≥ 500 ha), but these accounted for 92% of the burnt area.
In Portugal in 2025, these large-scale fires affected, above all, areas of scrubland and grasslands, often completely unmanaged.
Eucalyptus, often identified as the main problem, accounted for only 6% of the burnt area. A fact that helps to demolish the myth that certain species are to blame, when the truly decisive factor is how the land is managed - or not.

Visible and invisible costs
The consequences defy any attempt at calculation. The environmental impact is huge - in 2025 alone, up to 31 August, fires emitted 11 megatons of CO_2, equivalent to more than 20% of Portugal's total annual emissions.
The economic damage is likewise significant: in 2024, with a much smaller burnt area, losses were estimated at 67 million euros, above all in wood, biomass and carbon stored. In 2025, the figures will inevitably be higher.
And then there is the human cost. When a forest burns, it is also a way of life that burns. Producers and communities see their livelihoods burn. After decades of protection efforts, biodiversity burns. And the flames often destroy society's trust in its own response capability and its will to continue investing in the forestry sector.
This special feature, "Portraits of fire", provides an initial assessment. A factual and contextualised picture of the situation in Portugal and Europe, backed up by a wide-ranging and detailed infographic, with specific data on ignitions, burnt areas, emissions, causes and consequences.
This is the starting point for the in-depth investigation in the following chapters, where we look closely at risk factors, the answers which already exist and what happens after a fire. Our experts take a collective approach to the issues, rejecting over-simplification but confident that there are possible solutions.
The aim is to contribute to an informed debate, moving beyond the heat of the moment to build solutions for the future. ●



In this edition, we assembled some forty researchers, experts and industry professionals, to think about fires in a fresh light.

LESS FIRES, LARGER BURNT AREA

The numbers point to a worrying trend: less fire events, but the consequences are more severe.

Comparison with historical data for past ten years, at 31 August



number of wildfires down by **23%**



burnt area up by **259%**

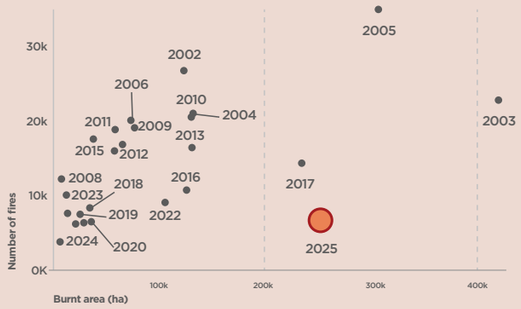
Comparing the figures with historical data for the 10 previous years, the number of wildfires was down by 23% but the burnt area was 259% greater than the annual average for the period.

From 1 January to 31 August, 2025 presented the 5th lowest figure for the number of fires, and the highest figure for the burnt area, since 2015.

Historical comparison

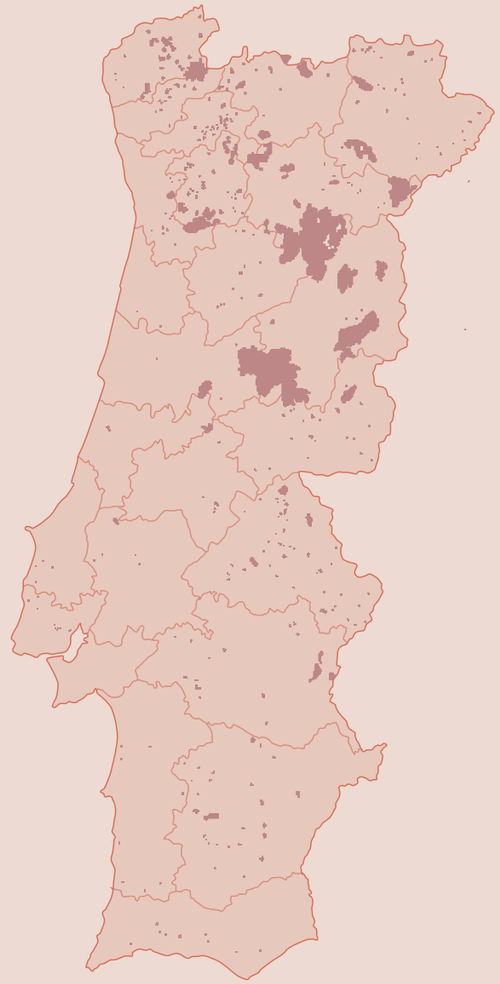
(1 January to 31 August)

Although the number of fires was below the historical average, 2025 was one of the three worst years ever in terms of the burnt area from 1 January to 31 August.



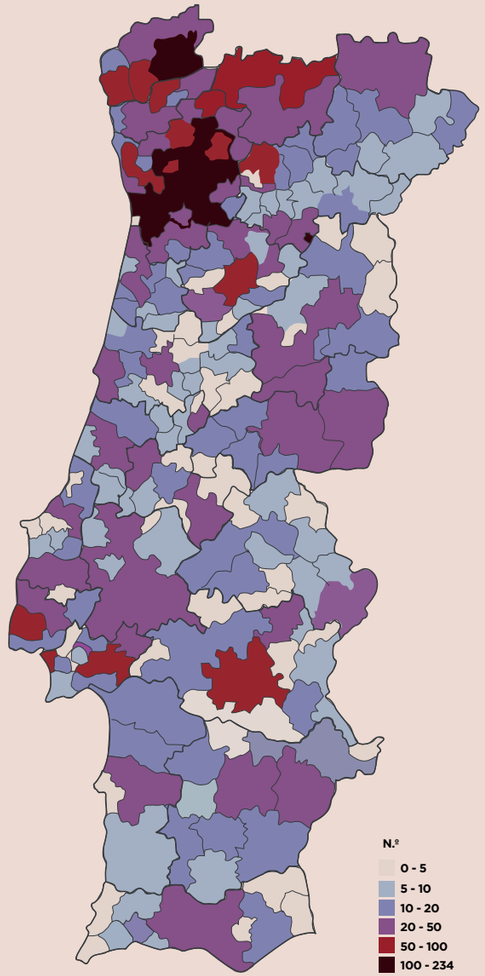
On these two pages, data from 1 January to 31 August 2025; sources: SGIFR/AGIF, ICNF

Burnt areas 2025



254,000 ha

No. fires 2025



7 046

Smaller fires are more numerous, but larger fires account for the overwhelming majority of the burnt area.

85% of wildfires presented a burnt area of less than 1 hectare, and these are most frequent.

83 fires with a total burnt area greater than or equal to 100 hectares.

25 fires with a total burnt area greater than or equal to 1000 hectares.

Fires with a burnt area ≥ 500 hectares

0,5% of total fires

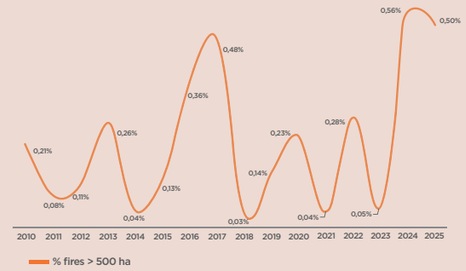
92% of total burnt area

35 TOTAL	18 NORTH	12 CENTRE	5 ALENTEJO

Six of these major fires (17%) started with a night-time ignition, between 10.00 p.m. and 6.00 a.m.

In the past two years, the frequency of large fires has increased consistently.

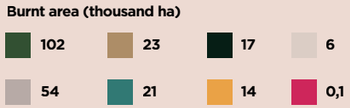
Percentage of wildfires with area of more than 500 hectares

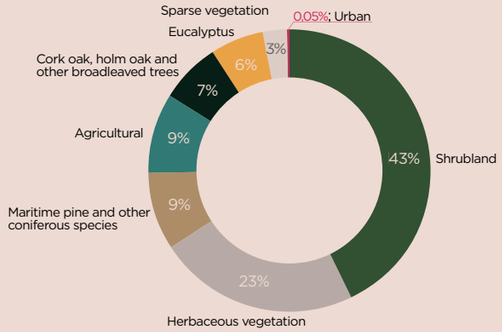


SCRUBLAND IS THE FORM OF PLANT COVER MOST CONSUMED BY FIRE

Plant cover burnt in major fires in 2025 (≥ 500 ha)

Scrubland and grasslands, areas typically left unmanaged and/or abandoned, together account for 66% of the burnt area.





Source: SGIFR/AGIF; data at 31 August

CAUSES

Most of the fires investigated were caused by human activity: arson, agricultural burning and carelessness continue to account for the majority of ignitions in Portugal.

Percentage breakdown of wildfires by type of known cause



Of the total of 7 042 wildfires recorded up to 31 August 2025, 4786 were investigated and the respective formal inquiry has been completed. Of these, the investigation identified a cause for 3 589 fires (75% of the cases investigated, accounting for 14% of the total burnt area).

*Transport and communications; use of machinery.
**Burning of waste, extensive burns and bonfires.

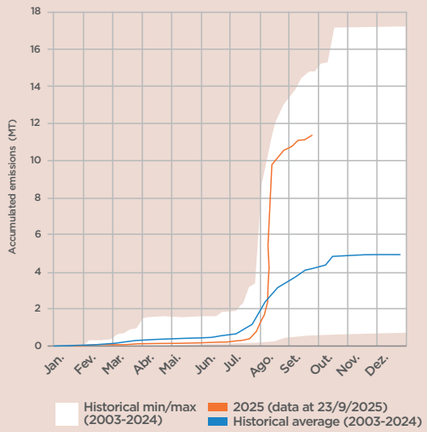
Source: ICNF; data at 31 August

CO_2 EMISSIONS

Forests have made a positive contribution to CO2 sequestration, except in years with large-scale fires . It is estimated that, between 1990 and 2021, forests accounted for annual sequestration of 5.58 Mt of CO2 equivalent.
2017, for instance, showed a sharp inversion of this trend: the LULUCF sector (Land Use, Land-Use Change and Forestry) accounted for 17.5% of Portugal's total emissions.

11 MT For comparison, the country's total emissions (2023 figures) are around 53 MT CO2e

CARBON DIOXIDE (CO2) EMISSIONS FROM FIRES



Source: EFFIS

SEVERE WEATHER HAS BEEN WORSENING

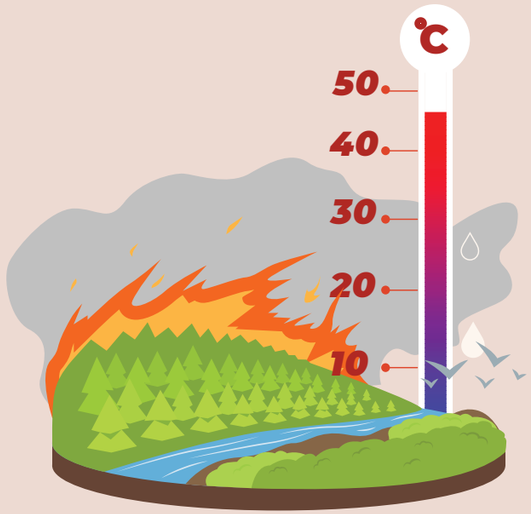
Extreme weather factors escalate the risk of fire, the size of events and their consequences. The data points to a pattern of increasingly severe weather.

Source: SGIFR/AGIF; data at 31 August

3rd 2025 ranks (joint) third for the year with the most days when the meteorological fire danger rating was at the two highest levels - "Extreme" and "Exceptional"

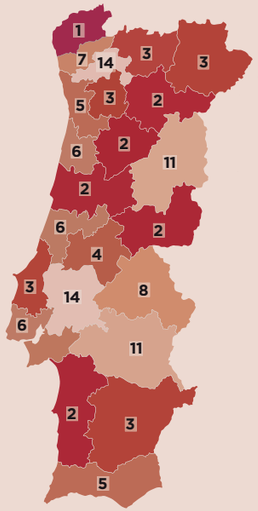
68% **of the burnt area** and **92%** **of large fires (≥ 5 000 ha)**

are the result, on average, of ignitions on critical days, highlighting the importance of how people behave during those periods.



Number of days of "Extreme" or "Exceptional" danger

1 January to 31 August



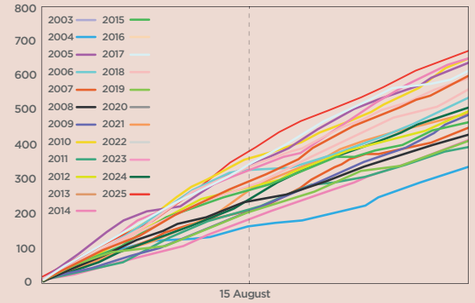
Year	No days	Position
2005	23	1
2022	22	2
2017	21	3
2023	21	4
2025	21	5
2006	19	6
2010	19	7
2012	18	8
2016	17	9
2004	16	10
2015	16	11
2003	15	12
2013	15	13
2009	14	14
2002	13	15
2020	12	16
2021	11	17
2019	10	18
2024	10	19
2007	9	20
2011	9	21
2008	8	22
2014	7	23
2018	7	24

Sub-regional position 2025

AUGUST 2025

The most severe since 2003, with several consecutive days when the meteorological conditions were conducive to the occurrence of major fires.

Daily Severity Rating (DSR), Mainland Portugal

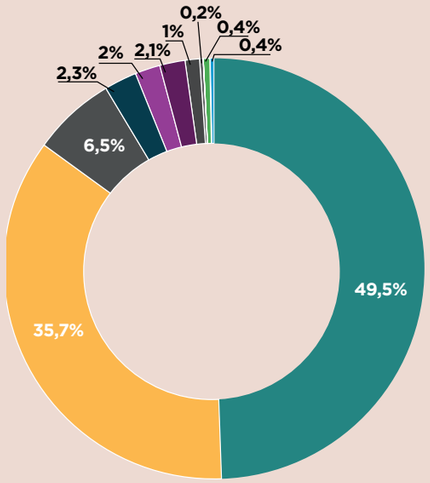


ECONOMIC IMPACT

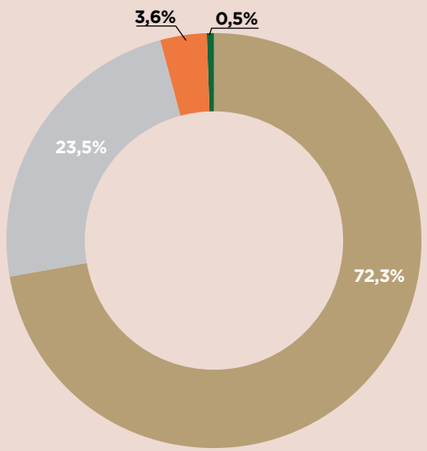
In 2024, fires consumed 38 666 hectares of woodland, with damage estimated at 67 million euros - above all in maritime pine and eucalyptus At the closing date of this edition, there was no data for economic losses in 2025, but considering that the area of woodland burnt totalled close to 97 thousand hectares at 31 August, the level of impact will inevitably be considerably higher.

In 2024, the volume of wood affected by fires was 2 364 589 m². The total loss of economic value, including materials (wood, resin, cork), biomass for energy, fruit and carbon stored, stood at 67 M€.

Total loss of value per forestry species (%)



Total loss of value per use (%)

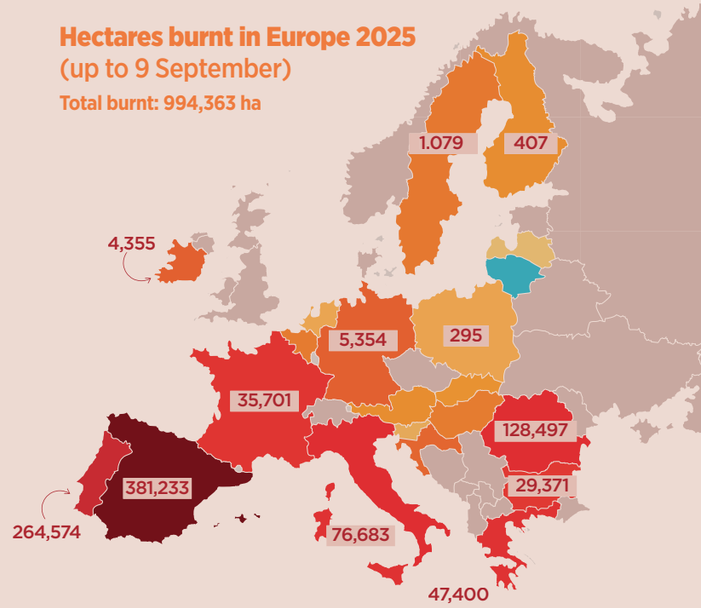


Maritime pine
Eucalyptus
Cork oak
Other coniferous species
Oaks
Scrubland and pasture
Other hardwood species
Holm oak
Umbrella pine
Chestnut
Materials
Biomass for energy
Fruit
Carbon

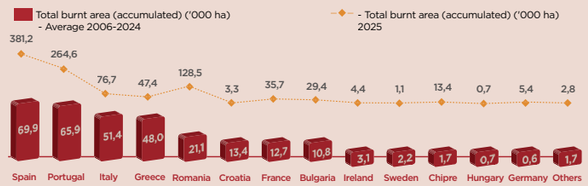
Source: SGIFR/AGIF; data at 2024

EUROPE--WIDE PROBLEM

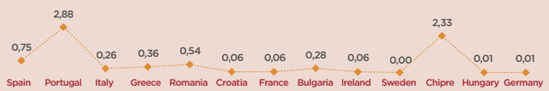
Wildfires are not just a challenge for Portugal. Throughout Europe, the tendency is for a heightening of the risk, driven in part by climate change, leading to more frequent and intense episodes.



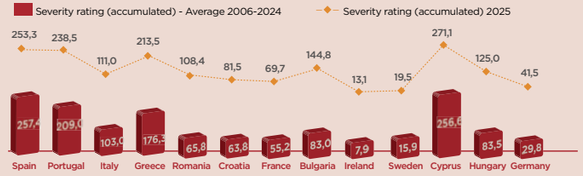
Burnt Area at 9 September



% Burnt area in total area of country

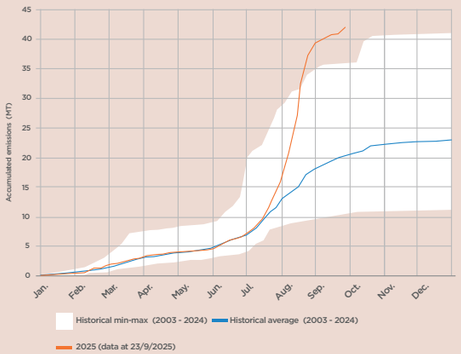


Fire Severity Rating at 9 September



CARBON DIOXIDE (CO2) EMISSIONS FROM FIRES IN EUROPEAN UNION

41 MT By way of comparison, EU emissions as a whole (data from 2023) totalled 3 222 MT CO_2e



Source: EFFIS

At the date of close of this edition, the European data available for the purpose of comparison between countries was for the period up to 9 September 2025. For Portugal, more up-to-date information had been published, indicating that at 10 October the burnt area totalled 282,410 hectares, corresponding to an increase of 6.7% in relation to the figure considered in the European comparison.

By Fábio Silva, Fire investigator

Fire chooses landscapes, not species

Every summer we see the same pictures of flames engulfing the landscape and hear phrases like “beyond the suppression capacity” or “lack of territorial management”. But what do they really mean? Why are some fires put out in hours and others become unstoppable, even when massive resources are deployed?
The answer lies in the behaviour of the fire, which results from the interaction between the vegetation, the weather and the relief. According to Byram (1959), the intensity of a fire results from the quantity of fuel that burns, the energy released and the speed of propagation. The more fuel, the drier it is and the further it extends without any breaks, the more energy is released. Finney and McAllister (2021) tell us that, at over 10 000 kW/m, fire creates ascending currents that alter the environment and render it practically uncontrollable.
These dynamics explain why heat, wind, drought and the accumulation of vegetation give rise to extreme fires. EASAC, 2019, (European Academies’ Science Advisory Council, which represents the science academies of European countries and provides scientific advice to the European Union) confirms that these events worsen as the countryside is abandoned. We can’t control the climate, but we can manage vegetation, reducing fuel loads and the fire energy. Clements et al. (2007) show that this management work is one of the most effective ways of limiting fires and protecting people and ecosystems. Understanding these dynamics is essential: it is the way we manage the countryside, or stop managing it, that explains much of what burns, where and how

Forestry plantations vs. natural forests

It is important to distinguish forestry plantations from natural forests.
The former are planned systems for production, generally monocultures with a rapid rotation, requiring continuous management. The latter present greater ecological diversity, but often go unmanaged, meaning that vegetation accumulates and increases the fire risk. Lindenmayer et al. (2023) remind us that the problem is not monocultures, but rather the lack of planning and maintenance which transforms any landscape into fuel.
This distinction is crucial for a realistic understanding of fire. Plantations, like eucalyptus forests, are regularly managed and the risk is more controlled. They occupy around 845 thousand hectares, a fourth of Portugal’s woodlands. In contrast, in untended woodlands, comprising scrubland and ageing forest stands, the lack of management causes fuel to accumulate and facilitates propagation. This is the forgotten and fragmented territory where prevention issues are decided. Figures from AGIF (Agency for Integrated Wildfire Management, 2025) help to clarify the debate. Although forests and plantations occupy a large portion of Portugal, eucalyptus forests accounted for only 6% of the burnt area in 2025, as compared to 69% for scrubland and grassland and 9% for coniferous forests. Large fires occur most of all in areas where land is abandoned and untended, causing fuel to accumulate. Many of them start in transition areas between fields, scrubland and uncared for woodlands, fragmented territories where prevention is all but impossible. The SGIFR (Integrated Wildfire Management System, 2024) report backs this up: the countryside is only cared for when it generates value. Planted production forests continue to be managed, whilst the areas producing no economic return are left untended. Land has to be valued, either for what it produces or else for its ecosystem services, in order to keep it active, resilient and less prone to fire.

The problem is not the species, it’s how the land is managed

I don’t know if we have too much eucalyptus, I don’t have the expertise to judge. But I do know that biodiversity is vital for the balance of ecosystems, above all in a scenario of climate change and fiercer fires. Rather than on opinions, we need to base our decisions on facts.
The first is that management limits the extreme behaviour of fire. Byram (1959) and Finney & McAllister (2021) showed



What fans the flames, year after year, is the failure to manage and value the land, and the lack of any vision for areas of the countryside no longer tended by their communities.

that intensity depends on the quantity and distribution of the fuel, rather than on its chemical nature. With management, the fire stays under control; without it, the vegetation accumulates enough energy to feed itself.
The second fact is a matter of statistics. Figures from AGIF (2025) support the idea that the pattern of fires is linked above all to territories which lack active management. The critical variable is not the species present, but how the land is cared for, or not.
To speak of the fires is to speak of territory. Structural prevention requires land use planning, investment and active management. Areas where the land is divided into uneconomic smallholdings are where fires recur most frequently. In southern Portugal, where properties are larger and managed on a broader scale, the problem is less severe. Where the land is managed, it is resilient.
Fire will always be part of our landscape, but it need not be catastrophic. What fans the flames, year after year, is the failure to manage and value the land, and the lack of any vision for areas of the countryside no longer tended by their communities. If we want a less vulnerable country, we have to transform the landscape into somewhere with economic, ecological and community value. Fire teaches us that we cannot go on just reacting: the time has come to plan and take action with a vision tailored to climate change and our geographical location, conciliating the urgency of ecological issues with economic sustainability.

Misconceptions about forests and fires

By José Miguel Cardoso Pereira and Aswin Thomas
Forest Research Centre, School of Agriculture, University of Lisbon

By the end of September 2025 more than 250,000 hectares had gone up in flames in mainland Portugal, for only the fifth time in the past fifty years. Four of those occasions were in the past 25 years, which points to an extremely worrying trend. Fire affects areas differently depending on the type of land use - in moderate years most of the burnt area is scrubland and pasture, whilst in extreme years it is above all woodlands that burn. In 2025, despite the large burnt area, less than 50% corresponded to forest, making this a somewhat atypical year.

Analyses of fire damage that divide land by type of forest and the species affected have to be read with care, because both the intensity of management and the vertical structure of the vegetation vary widely, and we believe these factors to be more decisive than the actual species growing in the woodlands in determining how fire-prone the land is and the severity of the effects of fire.

A study currently being conducted by CEF/ISA of the severity of the effects of fire on forest canopies in Portugal illustrates this question.

We used satellite images to classify post-fire forest canopies as “green”, “singed” and “burnt”, and we analysed the four most common types of forest in the areas affected: pinewoods, eucalyptus forests, other oaks (indigenous, above all deciduous) and other hardwood species (above all riverside trees and chestnut). The classification used enables us not only to distinguish between degrees of severity of the effects of fire, but also between surface fires (leaving green and singed canopies) and fires in the canopy (the canopies are burnt). We have so far analysed 70 fires with an area of more than 500 ha and with at least 25% forest cover, making a total of 52,000 ha, from four different years. The findings show that maritime pine is clearly the type of forest where canopy fires occur most frequently. Curiously, this type of fire affects woodlands of other oaks slightly more than eucalyptus forests. Canopy fires occur least frequently in other hardwood forests, favoured by the location along water courses. For the same reason, this type of forest also presents the highest proportions of green canopies, spared by the fire. Other oak woodlands have the second highest proportion of green canopies, which are rare in pine and eucalyptus forests.

The deciduous nature of certain tree species renders them less vulnerable to fire than evergreen species, because the annual renewal of their leaves means they have higher moisture content during the summer than evergreens such as eucalyptus and maritime pine, where the canopy contains leaves from several previous years, which are drier. It might therefore have been expected that woodlands of other oaks would prove less vulnerable to canopy fires than actually observed. On the other hand, in view of the inflammability of eucalyptus leaves and the propensity of the bark of this species to hang off the trunk in strips, it would be no surprise that the species were more frequently affected by canopy fires.

Data from the 6th National Forest Inventory (2015) for the four types of forest help to interpret the effects of fire observed. Figure 1 uses data from the 6th NFI for areas of woodland by ground cover, where it can be seen that the surface stratum of fuel in eucalyptus forests presents a significantly higher percentage for the area occupied by forest litter and bare soil, and less by scrub, than for other types of forest. Whilst this is clearly less desirable from the point of view of biodiversity, it helps to explain why eucalyptus forests are less prone to canopy fires.

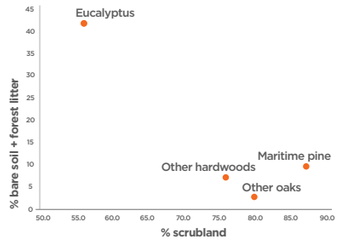


Figure 1. Composition of the ground cover of the types of forest analysed, according to data from 6th National Forest Inventory (2015).

Figure 2, also based on data from the 6th NFI, presents figures for the distribution of vegetation along the vertical vegetation profile for the points in the inventory where each forest type occurred as a pure stand.

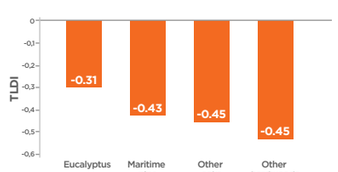


Figure 2. Tree layer dominance index (TLDI) for the four types of forest analysed.



Negative values for the tree layer dominance index (TLDI) mean that there was more plant cover below 2m than above this level, meaning that the shrub layer is preponderant. This dominance is less pronounced in eucalyptus forests and higher in other hardwood species. Maritime pine and other oaks present values for dominance of the forest by the tree layer approximately 50% higher than for eucalyptus

It is simplistic to seek to blame particular species or types of forest for the problem of fires, or to imagine that they are able to resolve it. We need to ask much more than just which species is present, and the intensity of forest management, which helps structure the vegetation so as to create vertical breaks between surface fuel and the base of the canopy, plays a decisive role in determining how vulnerable the forest is to fire. Another key factor that should not be ignored is the lie of the land, which affects the distribution of forest types and also their relationship with fire. Someone once said that all complex problems have a solution which is simple, obvious and unfortunately wrong. We would do well to remember this. ●

Both the intensity of management and the vertical structure of the vegetation vary widely, and we believe these factors to be more decisive than the actual species growing in the woodlands in determining how fire-prone the land is and the severity of the effects of fire.

The (in)visible impact: fire and the challenge for carbon neutrality

By Júlia Seixas, Full professor, NOVA University Lisbon



An article recently published in Nature[1] pointed to two conclusions worth remembering. From an analysis of 213 heat waves during the period 2000-2023, the authors demonstrate that, due to anthropogenic global warming, the median of heat waves (i.e. of their intensity, average temperature (°C) during the period and in the region of the event) in the decade 2000-2009 became 20 times more probable than in the period 1850-1900, and 200 times more probable in the decade 2010-2019. Considering the full period under analysis, the authors conclude that 25% of those events would be impossible in the absence of anthropogenic climate change. The second conclusion resulted from their analysis of the contribution of 180 major emitters of greenhouse gases to the series of heat waves studied. The concluded that 14 of the major emitters (former Soviet Union, coal production in China and India, cement production in China, companies like Saudi Aramco, Gazprom, ExxonMobil, Chevron, National Iranian Oil Company, BP, Shell, among others) were responsible for 28% of the increase in the intensity of heat waves and the others were responsible for 22%. Overall, the 180 emitters contributed to 50% of the increase in the intensity of the series of heat waves. These conclusions clearly illustrate the 'trap' into which mankind has fallen, and from which it needs to extricate itself as quickly as possible.
We should note what has happened in 2025: in Portugal, the burnt area was 2.3 times the annual average since 1980 and in Spain the fires were the worst in 30 years, with a burnt area almost four times greater than the annual average for this period. So far, Portugal has proportionally been the European country worst affected by fires. In absolute terms, it is also the country with the most hectares burnt in the period 2006-2024, with more than 1.8 million ha, followed by Spain with 1.5 million ha, and Italy and Greece with close to 1 million ha each. These figures are largely explained by the fact that August 2025 was the hottest month of August in terms of air temperature in 94 years, and the heat wave recorded one of the most intense, according to IPMA.
The impact of heat waves on the frequency and scale of wildfires is already obvious, and may be expected to grow. How should we view this situation in the light of the goal of carbon neutrality that Portugal wants to achieve in 2050, or even 2045 according to some political voices?
Direct and indirect CO2 emissions generated by wildfires have an impact on the national inventory of greenhouse gases (GHG) in what is called the LULUCF (Land Use, Land Use Change and Forestry) sector, which also includes changes in land use between woodland, farmland, pasture, wetlands and artificial areas, as well as wood and wood-based products. This clearly illustrates how the dynamic in Portuguese territory impacts the national GHG emissions balance sheet. Direct CO2 emissions are those released during the fire, and the indirect emissions are those which are attributed to fires, after the trees have died, and include, for instance, those deriving from the use of salvage, and those which occur during the decomposition of biomass which is left in the soil.
Portugal has now drawn up inventories for 34 years (1990-2023), and LULUCF has functioned as a sector of net sequestration in 28 of those years, and as a net emitter in the other six; this is directly related to the occurrence of wildfires. In 18 of those 28 years, the net sequestration capacity of the LULUCF sector was less than or equal to 5% of national emissions, in other words, very low. The years 1992 and 1993 recorded the largest net sequestration capacity, close to 6 MtCO2 and equivalent to 9% of the country's emissions, whilst the largest emissions of CO2, 15 MtCO2, equivalent to 21% of national emissions, were observed in 2017. The years 2003 and 1990 should also be noted as years in which the LULUCF sector functioned as a net emitter, accounting respectively for 10% and 8% of national emissions. By way of comparison, in Spain we may observe net sequestration capacity over an unbroken sequence of 34 years, varying between 11% and 19% of the country's emissions.
For 2030, PNEC 2030 (National Energy and Climate Plan) anticipates that the country will have net sequestration capacity of 6.5 MtCO2. This level of sequestration was never recorded over the 34 years of the national emissions inventory, and only one year - 2008 - comes anywhere close, with the record figure for net sequestration capacity of 6.1 MtCO2. You do not need to be an expert in wildfires to conclude that it is risky to rely on the contribution of LULUCF to the country's goal of carbon neutrality, unless steps taken to prevent wildfires start to produce visible effects and, at the same time, fire-fighting methods are revolutionised. The simultaneous occurrence of high-impact wildfires in several locations, not only in Portugal, but also elsewhere in Europe, occupying the resources of the European Mechanism, points to significant pressure on fire-fighting resources in the current climate, i.e. with warming of 1.3 °C in relation to the pre-industrial era, and has tested the resilience of territories to the limit. It is by no means certain that Portugal will have a contribution from LULUCF towards its goal of carbon neutrality. ●

(1) Quilcaille, Y., Gudmundsson, L., Schumacher, D.L. et al. Systematic attribution of heatwaves to the emissions of carbon ajors.Nature645, 392–398 (2025). https://doi.org/10.1038/s41586-025-09450-9 (2) Extreme fire weather conditions in Spain and Portugal now common due to climate change. World Weather Attribution. 4 September 2025. (3) Portuguese National Inventory Document on Greenhouse Gas Emissions, 1990-2023. Submission under the UNFCCC. Agência Portuguesa do Ambiente. March 2025. Amadora.

Wildfires: tackling Portugal's vulnerability

By Paulo Pimenta de Castro, Forestry Engineer

This year, as in recent decades, Portugal remains significantly vulnerable to forest fires, and risks setting a new European Union record for the burnt area (absolute) and the relative burnt area overall.



Depopulation has contributed to this vulnerability, with larger burnt areas recorded in regions where the population density is lower, a cause of concern in a country where humanised ecosystems predominate. This vulnerability is exacerbated by high-risk behaviours associated with the use of fire and the remoteness of wooded areas in relation to many infrastructures, including residential areas.

Further factors of vulnerability include the widespread abandonment of the countryside and the lack of planning, in particular in regions where land is divided into smallholdings, and the extensive and unbroken areas where wood - in particular, eucalyptus and maritime pine - is produced for chipping, to which we can now add the influence of climate change. At the landscape scale, there is still strong resistance to changes that would make the countryside safer, and political and administrative decision-making is still severely constrained by the industrial forestry sector. This compromises not only the health and safety of the population, but also the need to reduce greenhouse gas emissions and future supplies for industry.

In comparison to previous decades, recent years have presented distinct differences, with an increasing proportion of the burnt area located in production forests rather than scrubland, along with an upturn in the occurrence of meteorological phenomena associated with more frequent heat waves, as well as more recurrent continental winds, which are now stronger and drier.

Although fires started by arson have a significant impact, the main cause remain careless use of fire, in other words, unintentional fires. In both cases, the solution entails expanding surveillance capability. However, it is very important to ensure that woodlands are properly and effectively managed, especially those used for intensive wood production, conciliating a satisfactory return on assets with the diversity of services provided by these woodlands. Remuneration for forest ecosystem services is overdue, as is regulation of the markets for goods such as wood and cork, especially in sectors dominated by large industrial players, where prices for raw materials, produced above all by private landowners, are set in a way that points to imperfect competition, in other words, where the industrial buyers set the prices unilaterally.

Lastly, and as regards surveillance of woodlands, we can also point to the pernicious effects of the abolition of the national corps of forest rangers in mainland Portugal and the gradual dismantling of the State's forestry authority. If all these weak points were corrected, not only would the burnt area be smaller, but woodlands would be a safe and profitable investment. ●

It is very important to ensure that woodlands are properly and effectively managed, especially those used for intensive wood production, conciliating a satisfactory return on assets with the diversity of services provided by these woodlands.

Another difficult year

By Domingos Xavier Viegas, Emeritus Professor, University of Coimbra

In 2025, we are once again experiencing a difficult year as regards forest fires. Although the period in which the most serious fires have historically occurred is not yet over, we can already regard his year as one of the worst of the millennium, in terms of meteorological conditions, the burnt area and the extent of the damage. It is timely to start reflecting on what is happening, on why we continue to be one of the European countries with the largest area burnt in fires, despite having embarked in 2017 on a process of improving our system for managing the fire risk, which is regarded as one of the most advanced in Europe.

In several parts of the world, the problem of wildfires is worsening, and in others it is emerging as a new threat. Several studies show that in the expected climate change and socio-economic scenarios, we will face even more severe conditions, in the decades ahead, in particular in southern Europe, as we are beginning to see.

Portugal's climate combines exposure to the Atlantic with the influence of the Mediterranean, making it simultaneously highly productive in biomass, due to the rainfall, and amply supplied with fuel with a low moisture content, due to the heat, to permit the ignition and propagation of very fierce fires. In a large part of the country's territory, especially in central and northern regions, the



relief is complex, which means access is difficult and fire spreads quickly. Lastly, a large part of inland Portugal is depopulated, or home to a population with meagre economic resources and lacking the capacity to manage the countryside appropriately. Most of the land is divided into smallholdings, which is another obstacle to profitable farming or forestry. In addition, there are constructions and small settlements scattered across nearly all the territory, and in the event of fire they are exposed to the flames and also hinder efforts to control them.

Over recent decades we have seen the country beef up its fire suppression capacity, with a network of well-structured resources. Forceful primary intervention has been able to tackle around 90% of ignition points. Unfortunately, on days when the fire hazard is most severe, or when more ignitions occur, these ignition points get out of control, and increasingly have the potential to become major fires. Since the nineteen eighties, we have seen the average area of the five largest fires each year gradually increase, due to the combination of the factors described above. Improvements in the system for managing fuel and reducing biomass have started to be visible in recent years, but given the slowness of this process, the results are not yet as effective as might be desired.

It is undeniable that criminal arson remains an important component in the problem of fires in Portugal. Although there is no excuse for such criminal actions, we have to acknowledge that the incidents of arson have not declined and have caused an increasingly significant portion of the burnt area over the years. It is important to seek to bring down this number, through increased surveillance of woodlands, using human and technological resources, to deter potential arsonists. Rather than increasing the penalties for this type of crime, I believe it would be more useful to ensure they are enforced and publicised, as a further form of deterrence.

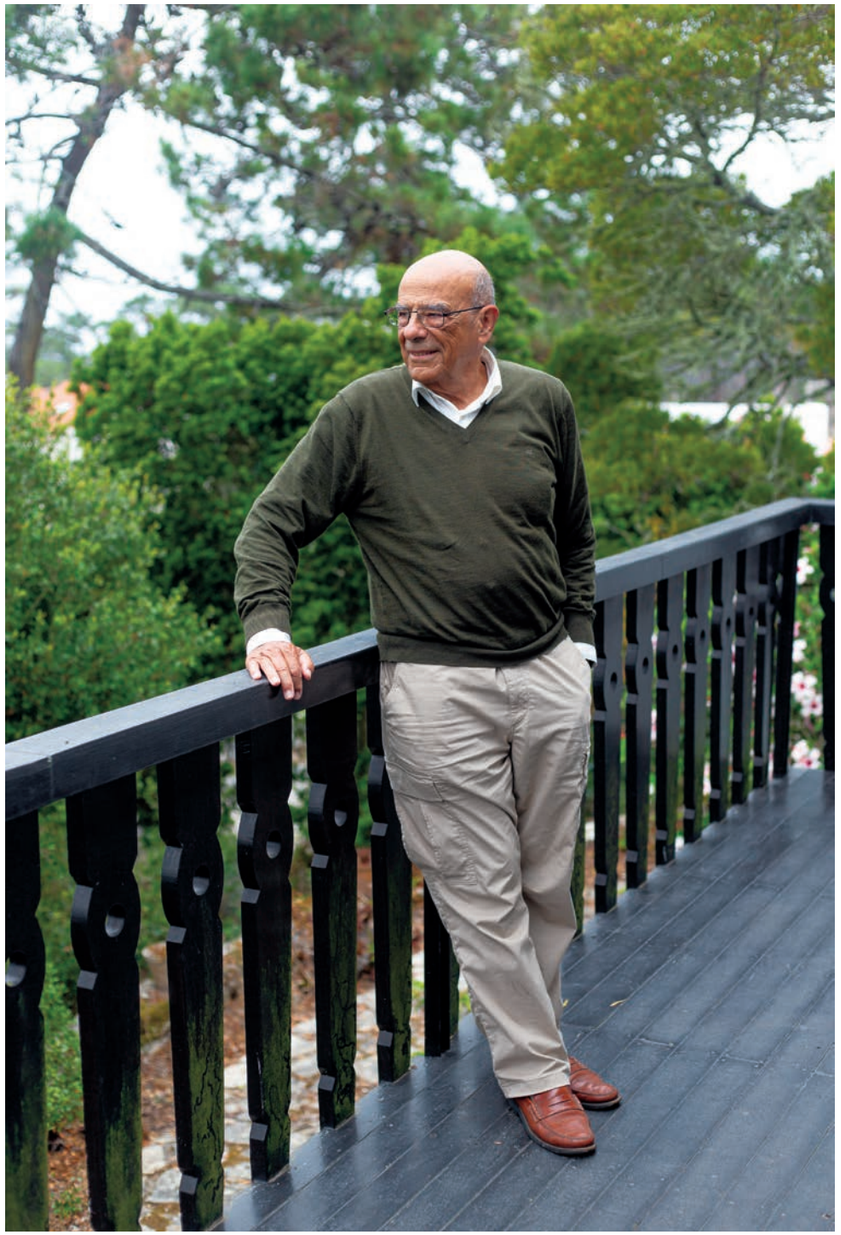
THREE QUESTIONS FOR…

Filipe Duarte Santos, Specialist in climate change

“The probability of major fires is 5 to 10 times greater in the Mediterranean region of Europe”

What are the three main reasons that explain why Portugal is so vulnerable to fires?
According to figures from the European Forest Fire Information Service (EFFIS), we are the country where the average percentage of burnt area each year in forest and wild fires in the period 2006 to 2024, in relation to the area of mainland Portugal, is the highest out of the 27 countries of the UE, at 1.05%. The next highest are Greece (0.38%), Cyprus (0.32%), Croatia (0.24%), Italy (0.19%) and Spain (0.16%). In the Iberian Peninsula, the two countries have practically the same percentage of forested area: 36.7% in Spain and 36.2% in Portugal (Eurostat and DG AGRI, 2020).
The main reason for this startling fact is that forest management in Portugal is often deficient in comparison with other countries in the Mediterranean region of the EU, although there are examples of excellent management. Of the five countries in that region (Spain, France, Italy, Greece and Portugal), the first three presented a clearly downwards linear regression of the burnt area over the period 1980 to 2023; in Greece, it was only slightly downwards and in Portugal it was slightly upwards (San-Miguel-Ayanz et al., 2023).
The main causes of poor management are multiple and interconnected: radical changes in land use and agricultural and forestry activities since the early twentieth century; depopulation of forested regions, especially inland regions; ageing of the resident and other population; the division of private rural property into smallholdings, especially in central and northern Portugal; inheritance, tax and urban planning law is out of step with socio-economic and cultural changes; abandonment of small rural holdings; low potential returns from much of the country’s woodlands, aggravated by shorter cycles of major fires in recent years, preventing or hindering sound forest management.
The second reason is climate change which, in Portugal, has brought a hotter and drier climate, in which meteorological situations with a high risk of fire have become more frequent. This climate change has created the conditions for extreme fires, with an intensity of more than 10 MW/m, which are very difficult to extinguish and affect large areas (Bowman et al., 2020). The fraction of the burnt area represented by extreme fires is now greater than in the past (Royé et al., 2020), posing significant civil protection and environmental challenges. The probability of occurrence of fires with a burnt area of more than 2500 ha in the Mediterranean region of Europe is 5 to 10 times higher than that observed in other biomes in Europe. The models indicate that this probability will double by 2100 in our region (Grünig et al. 2023).
The third reason is the limited training, skills and range of professional expertise for addressing the country’s vulnerability. Since 2017, greater value has been placed on protection, especially after the creation of AGIF in 2018. At that time, only 20% of investment in preventing and fighting forest and wild fires went to prevention. At present, the two components enjoy similar levels of investment.

“In Portugal, climate change has brought a hotter and drier climate, in which meteorological situations with a high risk of fire have become more frequent.”



Great progress has been made in preventing forest and wild fires with innovative activities such as the creation of fire breaks and mosaics that break up the forest. The presence and intervention of fire fighters in these areas may prevent fires from progressing. Since 2017, much progress has also been made in protecting people and the respective populated areas and infrastructures. Greater priority has been attached to this extremely important aspect of protection, and defence of the forest itself has taken a back seat, especially in more remote and protected areas. A better balance is needed between these two objectives.

Name two major differences between fires today, and those of the past.
Extreme fires, which burn large areas, are more frequent, due to two causes:
1 - More frequent and extreme meteorological conditions presenting a high level of fire risk, as a result of climate change.
2 - Huge accumulation of fine biomass in forests, as a result of deficient management by rural smallholders. The annual cost of removing this fine biomass is estimated at 900 million euros, which will have to be public expenditure, in view of the economic unfeasibility of this being done privately.

What solutions can you suggest for reducing instances of arson in Portugal?
Many specialists in forest management, prevention and fire-fighting downplay the importance of arson as a factor in Portugal’s vulnerability and consider that to mention it is to let others off the hook. In my view, it is a major cause, requiring the criminal rules on arson to be adapted to the current vulnerability of woodlands in Portugal. ●

Gary Morgan, International expert in fire management

“Climate change shouldn’t be an excuse for major forest fires”

Gary Morgan is one of the world’s leading experts in the management and behaviour of forest fires. In drawing a picture of fire, in particular the fierce, large-scale events we have seen, he stresses that a collective effort by society is the only way to successfully mitigate the problem. And he warns: the climate can’t explain everything

Chairperson for the Government of Victoria’s Ministerial Advisory Committee (Australia) on the wildland fire risk, Gary Morgan has more than four decades of hands-on and scientific experience in the integrated management of forest fires. He has been responsible for coordinating major operations in response to wildfires, for implementation of controlled fire programmes in vast forest areas and for training international teams, including Portuguese personnel, in the behaviour of fire. He has worked with governments, universities and international organisations, including Portuguese bodies such as AGIF and ForestWISE, contributing to the development of systems for forecasting and sustainable management of fire regimes.

Interviewed by My Planet, Morgan deconstructs a number of myths often associated with forest fire disasters. And he is clear in asserting that climate change should not serve as an excuse for the scale of fires: the core problem lies in how the territory and fuel is managed. He underlines that fire is endemic to countries like Portugal and that, in certain ecosystems, it even plays an essential role in regeneration. To focus solely on fire-fighting is to heighten our vulnerability, enabling fuel to accumulate and then feed even fiercer fires.

The solution, he argues, is to reduce the levels of fuel through active management, which includes the use of controlled burning, community education and a clear government vision for the future of plant cover. Only then will it be possible to prevent catastrophic fires and create more resilient landscapes.

In recent years we have seen wildfires and forest fires grow fiercer, faster-moving and more unpredictable. In your opinion, what factors are really changing the behaviour of fire?

A lot of people point to climate change and the unpredictability of forest fires as the underlying reasons for catastrophic large-scale forest fires. These are just excuses, not the real causes.

There are three essential elements influencing the intensity of a forest fire and the speed with which it spreads on the ground - the quantity of fuel available, the weather conditions associated with the fire and the type of relief. Climate change is affecting the weather associated with fire. In some regions, climate change is responsible for more rainfall. In others, it creates drier areas subject to stronger winds. Mitigating these changes in the climate demands attention at a global level.

The type of relief can’t be changed. The only element that can be changed in the short term in order to constrain the behaviour of fire is the quantity of fuel available to burn.

In recent decades, research into fire and the associated meteorology has brought huge advances in our

PORTRAITS OF FIRE



“Portugal is a country where fire is endemic in its landscape and the country cannot expect to eliminate it from the environment. We have to learn to live with fire and to manage it.”

knowledge of forest fires. At present, we are able to identify the days when there is an extreme danger of fire. When a fire breaks out, we have forecasting models which indicate the most likely pattern of propagation in a given territory.
Whether Portugal will be affected or not by fiercer and faster spreading fires depends on whether the bodies responsible make use of the most up-to-date scientific knowledge, experts in land-use planning and fire analysts with the skills that enable them to apply the available knowledge and models, as well as on whether fire fighters act in accordance with the integrated fire management system.

Many experts say that there has been a change in the “fire regime”. What exactly does this concept mean and how does it apply to countries like Portugal?
In territories where fire is endemic, such as in Portugal, we can observe a pattern in the frequency of fires, their intensity and the period of the year in which they occur. We call this pattern the fire regime. Natural regimes vary depending on the type of ecosystem, the climate and the relief. Humans can intervene in this fire regime, preventing propagation or altering the frequency of fires, so as to increase or reduce the intensity of fires.
The focus on suppression, by trying to avoid all fires (controlled or otherwise), reduces the biodiversity of species of flora adapted to fire, which need it in order to regenerate. The prolonged absence of fire can lead to increase accumulation of fuel which, when it catches fire in drought conditions, burns more intensely, causing more damage.
The behaviour of fire follows the same physics as a bonfire. The more fuel you add, the higher the flame and the greater the heat generated. Likewise, a forest fire that burns in an area with a large quantity of dry material, will produce higher and more intense flames. As a consequence, it will be harder to extinguish.

In your opinion, what are the main ecological, economic and social factors contributing to this new reality?
Many countries around the world have given priority to fighting forest fires to the detriment of mitigation efforts. As a result, the number and scale of fires has increased.
Often, climate change has been used to explain the increase in burnt areas and the fire-fighting costs. However, this was not the explanation accepted by the 2017 Independent Technical Commission in Portugal. There are other factors at play which influence this complex problem. If the Portuguese government gets on with the difficult task of improving management of the countryside and forest fires, addressing the underlying issues which have caused costs to escalate, then Portugal will be amply rewarded. With time, other countries will follow the Portuguese approach to managing forest fires.

Are we dealing with a regional issue or is this a global concern?
Portugal is a country, just like Australia, where fire is endemic in its landscape. Neither of these countries can expect to eliminate fire from the environment. Indeed, there are ecosystems where the disruption caused by fire is fundamental for their health. We have to learn to live with fire and to manage it.
Mistakenly, a lot of people interpret the increase in the burnt area as a problem solely of fire-fighting. It might be that when the fire brigades fail to follow the integrated management system. But in most cases, it is a problem that has to do with management of the territory. Governments have to decide what sort of plant cover they want in future and, on that basis, manage the fire regimes so as to avoid fires from attaining catastrophic dimensions or becoming more frequent.

To what extent do factors such as globalisation, desertification of interior regions and changes in land use increase our vulnerability to fire?
All these factors have undergone changes over the millennium. They all influence the quantity, frequency and intensity of fires, controlled or otherwise. Vulnerability to fire depends on the measures implemented in order to keep fuels at levels which do not cause negative impacts. This responsibility lies with those managing the territory, the landowners and governments.

What obvious lessons can Portugal learn from Australia’s experience? What similarities and differences can you point to between the two contexts?
In 2017, forest fires put Portuguese society, tragically, to the test. They made people realise that integrated fire management is no longer just a matter for the forest fire brigades or specialists in planning and landscape management. Portugal took an important step forward by setting up AGIF and adopting an integrated management system, but a significant improvement is needed in the use of fire with a view to sustainable management of the territory and more effective and efficient fire-fighting.
There are several opportunities for improving the management of forest fires in Portugal. Systematic risk management procedures can help define goals for managing territories and fuel, as well as ensuring that operations are effective. A better understanding of incident management systems, and the related training, will enable all fire-fighters to understand the aims and strategies for fire suppression. Sharing ideas, experience and know-how will help foster development of adaptive management.
In Australia, we increased the number and size of our aircraft, but the fires are still getting bigger. It’s obvious we are not being effective. Aircraft are useful when properly managed, especially for gaining time until operatives arrive on the ground. But it is fundamental to understand that planes alone do not put out fires. You have to have fire-fighters removing the fuel, using manual tools or machinery. There is a better alternative, which entails using aircraft strategically and keeping the focus on managing the territory, using the principles applied by Australia’s indigenous peoples and by Portuguese shepherds - introduce low-intensity fire into the landscape at the right time,



“Vulnerability to fire depends on the measures implemented in order to keep fuels at levels which do not cause negative impacts.”

so as to preserve biodiversity and reduce the level of fuel. That way it will be possible to avoid fires on a catastrophic scale.

On the basis of your experience, what public policies have proved most effective in mitigating catastrophic fires? And what are the most common mistakes that countries repeat?
Land ownership issues in Portugal point to the importance of coordinated and comprehensive legislative and government support, based on a clearly defined and widely accepted vision, and on concrete goals, for the range of ecosystem services that the environment can provide, including food, biodiversity, wood, water, trade and the safety of persons.
In the absence of a clear statement by the government concerning its vision for the country and the desired outcomes for the plant cover in its landscape as a whole (covering different ownership regimes), forest fire management lacks consistency and effectiveness. Unfortunately, this is a problem shared with most of the fire-prone countries.
Responsible management requires forestry actors to be clear about the desired end state for the land they administer, together with the corresponding level of fire risk reduction they are aiming for.

Do you think that the role of local communities and forestry landowners is being properly recognised in prevention and adaptation strategies?
The role of local communities and forest landowners in prevention and adaptation strategies may or may not be fully recognised by the government or the bodies responsible for fire-fighting. What matters is that local communities and forest landowners should take the right steps to reduce fuel levels and prevent undesired ignitions. There should be incentives and a legal framework that encourages communities and owners to manage the fuel, including the use of controlled fire within clearly defined criteria. After extracting wood, the area should be rehabilitated so that fuel levels remain within acceptable limits.
Portugal would benefit from having local communities better empowered to adapt to the fire risk, enabling them to shoulder responsibilities in prevention and preparation, which would result in more resilient communities.
In October and November 2023, six Portuguese professionals from different organisations travelled to Western Australia where they received training in the theory and practice of controlled burning and fire management. Five of these participants were funded by the Rotary Foundation, through a Vocational Training grant, and the sixth place was funded by AFOCELCA. The technical staff learned how to conduct a controlled burn in the undergrowth of eucalyptus and pine, complying with well-defined criteria, so as to reduce the quantity of fuel without damaging the trees.
Some might say that eucalyptus trees are a problem when it comes to fire. They're wrong. The real problem is the lack of fire management in connection with these trees. Left unmanaged, they create a severe fire hazard, in addition to a financial and social burden.
A sensible approach, based on risk for an extensive landscape covered in eucalyptus, consists of conducting prescribed burns in a mosaic pattern creating different fuel levels. The strategic location of these areas of controlled fire provides fire fighters with opportunities to halt forest fires spreading throughout the area planted with eucalyptus.

How do you see the role of science and of international cooperation in the response to this new fire regime?
Science and international cooperation are vital at a time when the world appears to be entering a phase featuring fire regimes in which fierce fires are more frequent. A lot of research has been done, but we need more communication to share what we've learned.
The knowledge silos which exist between and within organisations prevent know-how and insights from being transferred successfully and widely to other scientists, field officers and managers.
ForestWISE can serve as a good basis for effective transfer of scientific knowledge about fire and for collaborative research and management in this area. ●

"Portugal would benefit from having local communities better empowered to adapt to the fire risk, enabling them to shoulder responsibilities in prevention."



"Some might say that eucalyptus are a problem when it comes to fire. They're wrong. The real problem is the lack of fire management in connection with these species."



Televisions in flames and journalism in ashes

By Carlos Magno, Journalist

The pictures don't convey the smell and the high temperatures don't melt the cool screens, when reporters reel out the numbers for fire-fighters in the field and hectares burnt.
The fire map shows places that never make the news and vaguely remembered hills which the smoke transforms into the lost landscape of rural Portugal.
Planes fly overhead and the sirens sound over the cries of despairing locals, in a bedlam of plastic buckets and hose pipes spurting futility.
The images are repeated, almost identical to each other, so that they look like archive footage - they could be from last year, or even a preview of next year.
The fire season arrives with the summer and lingers into the autumn after the holidays, with classrooms waiting for teachers and the first rains preceding the floods.
Every year, this is the unchanging and unchangeable media agenda.
Journalists know that while many of their fellow countrymen take their holidays in the real country, they have their summer reporting guaranteed and can repeat the usual adjective-laden clichés condemning those who failed to take preventive action.
They can rail again eucalyptus plantations and offer up comparisons of the areas of the country burnt under previous governments.
Because in Portugal fires are always political and the flames spread to the parties who turn on each other, seeking to blame whoever let more of the country burn or burned the least.
Ever since António Costa, as Minister of Internal Administration, was accused of issuing orders live on news bulletins on how to tackle the blazes, the topic has become a neurosis in the country's political life.
The same minister had ascended to the premiership and was still new at the head of his improvised coalition when more than a hundred Portuguese citizens died on a road to hell in 2017.
The tragedy and the horror inspired monuments and the ashes settled over the courts, which sought to establish the fault of persons unknown and we saw the faces of local councillors asking us: Why me?
Forgive me if I sound cynical, but these are my personal thoughts about the news media and its extraordinary ignorance about forests, fires and how to fight them.
Last year, my own village in Vinhais was the top story in the TV news bulletins because it was in danger and the blaze meant that residents had to be evacuated. I saw my father (aged one hundred) on television alongside my mother (well into her nineties), being very well treated by the civil protection workers, and I was relieved to get a call from the mayor, Luís Fernandes, who assured me: "You don't need to come. You can't get there anyway. But we're doing everything we can and human safety is sacred".
This year, the flames were back. I drove from Chaves towards Vinhais and saw a huge cloud of smoke at the end of the road. I thought the fire was round the next corner. I was wrong. It was an optical illusion. I kept driving and only some forty kilometres further on did I realise that it was the hills around my village in flames again. I shall never manage to be sufficiently grateful to the fire-fighters who defended my olive grove and saved the olive tree I planted with my grandfather when I was six years old.
There were sightseers at the best vantage points and cars parked along the roadside, to watch the planes fly past, with helicopters hovering over the river banks.
I finally realised that you can't see the fires in person or on the television.
There is only one way to describe the course of the fire and the ferocity of the flames: using physical geography.
There is no point in looking at a road atlas, or on Googlemaps. You need to look at the old military maps, where the territory is properly charted.
Because what's at stake is the defence of the country. And war in the almost primitive sense of the term.
Forgive this barbaric prose, but having taught journalism for several years, I have to acknowledge: Journalism can't be taught. It can only be learned.
Covering fires should be compulsory subject for those exposed to the flames as roving reporters.
You need to teach geography to journalists and show them the old army maps. Only then will we be able to say where the fire is. And who the enemy of the news is. ●

Covering fires should be compulsory subject for those exposed to the flames as roving reporters.

The ethical and political duty of the media in reporting fires

By Miguel Boó, PhD in Media Studies, University of Vigo

In 2023, Galicia's Board of Culture, a statutory body in which the head of the regional government is honorary chairperson, published a report that purported to be technical, rigorous and objective. However, it reflected only the thinking of environmentalists and ecologists, and the bibliography was short on scientific references. And so, half a century on, it told the same story: it classified eucalyptus as a hostile pyrophyte, invasive, allochthonous species which degrades the landscape, enters into conflict with the wildlife and is grown as a monoculture.

When, ten years ago, I published my doctoral thesis ("Eucalyptus' bad press"), most of the myths I investigated still persisted in the media, in preconceived ideas to which the sector had clung from at least 1975 until 2011. It is fair to acknowledge that, since then, as regards fires, media reporting has improved, apart from some exceptions, such as the report I mentioned at the start.

However, despite this progress, I believe a greater effort is needed to avoid misjudging what is actually a neutral stance when a news report presents both sides of the argument. It is wrong to assign the same value to the words of a scientist and to the testimony of someone affected or of an occasional observer. What is more, the media tends to concentrate on reporting the effects of fires, often to excess, when it ought to show what landowners and the authorities do by way of prevention; when they should serve as a channel for educating people about how to act during a fire or how to protect their house; and when they ought to examine and/or denounce the progress made in rehabilitating burnt areas from previous fires.

The media has here an ethical and political duty - which they fail to honour, because they are always waiting to report the next fire, the imminent dramas, that what we journalists call 'human interest' - to investigate broken promises and to denounce measures which are announced and almost never implemented by local, regional and State authorities.

In Galicia, more than 90% of forest fires are caused by human activity. The factors that enable this to happen are well known. That these familiar culprits have been joined by the impact of climate change offers nothing to add to the profile of the typical arsonist, let alone to incriminate the species. A species that continues to be blamed for forest fires, although the opposition to the "demonised tree" is now focused on stopping the construction of a cellulose mill - dusting off its slogans and banners from fifty years ago, brandished by the same campaigners with the same media strategy.

The fires are currently so uncontrollable (and I believe that this also applies to Portugal) that, even if the human and material resources were tripled, it would still not be possible to control them. However much people call, from the opposition benches or from remote communities, for more planes, more helicopters, battalions of drones, armies of robots, military patrols, the use of artificial intelligence or Ecofire extinguishers (ten times more effective than water, with an organic and biodegradable liquid, but for which there are still gaps in the logistics), little or nothing will be achieved.

And when we say that the tools will not be sufficient, even if they are increased exponentially, we are not speaking of a distant future. It is possible that we will face such a scenario next year, if the fires go from causing dramatic damage to tragedies of unsustainable proportions. That is why it is so important to shout from the rooftops that the authorities should be looking right now at this eventuality, however far-fetched it might appear. Because, if a few sparks can wreak such devastation in the mountains, we have already seen what happens when the blaze gets close to people's houses and, increasingly, to densely populated areas.

The authorities should use the autumn and winter to be better prepared for these eventualities which, unfortunately, are bound to recur. Because, in addition to the work of clearing undergrowth and fighting fires, which for decades have manifestly been poorly done, we now need to add civil protection plans to respond to a potential exodus in the face of uncontrollable fire events.

At it falls to the media to remind people that these responsibilities lie with the politicians who govern us. ●



RISK FACTORS

Portugal ranks second from bottom in the European Union for the area of woodlands where management plans are in effect. It is also the EU country where, from 2006 to 2024, the largest percentage of its territory was ravaged by fire (1.05% on average). The figure in 2025 will be worse, with 3.02% of its territory burnt up to 31 August. Science and experience in the field shed light on the relationship between these two facts: when woodlands are managed, they are better able to withstand the spread of fire, thanks to practices such as control of fuel, creation of fire breaks and access routes.

Managing the countryside is managing its hazards

The risk factors behind rural and forest fires are varied - land divided into smallholdings, depopulation and ageing, poor economic returns and abandoned land. But they all have the same outcome: they hinder or thwart active and consistent management of the territory. Climate change has added periods with especially dangerous meteorological conditions, raising the probability of large-scale fires. In this context, "risks" are not "causes" (such as arson, accidents or natural phenomena). Risks are the conditions that are conducive to major wildfires and their consequences, whatever their cause.

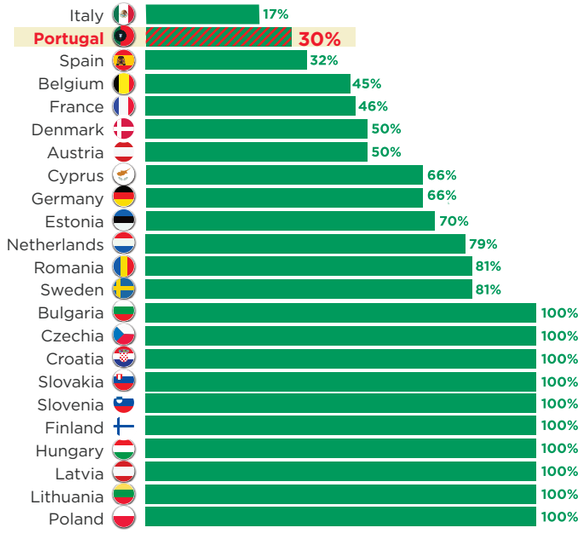
Fires in Portugal are changing: there are less ignitions, but a larger burnt area concentrated in a few large scale events.
In its preliminary report on 2025, the SGIFR (Integrated Wildfire Management System) notes that fires spreading to more than 500 hectares represent only 0.5% of all events, but account for 92% of the burnt area.
The first mega-fire (affecting an area of more than 10 thousand hectares) in Portugal was recorded in 1986, in Vila de Rei. Since the turn of the century, they have occurred more frequently, and more than fifty were recorded up to 2023, also according to SGIFR. In 2017, the fire in Pedrógão Grande was the first in Europe to be classified as a "6th generation fire" - phenomena which release a quantity of energy able to alter meteorological conditions around them. This year, up to 31 August, the fire in Arganil was the largest ever in Portugal, consuming more than 64 hectares.
Climate change creates favourable conditions for these events, in particular in regions such as the Iberian Peninsula, and in other countries in Mediterranean Europe. In this new climate scenario, risk factors which already existed now call for growing attention in view of the consequences that can be expected, insofar as "risk of fire" now also means "risk of large-scale fire".

The underlying risk of unmanaged land

Risk factors for wildfires can be traced to different origins, but they all converge on one underlying element: the conditions that fire encounters on the ground (unbroken expanses of woodland and the fuel load, the state of the undergrowth, land use mosaic, road network), which enable or hinder propagation and scale.
It is the way that the countryside and woodlands are managed that shapes these conditions. Failings in this area cause the risk to rise, propagation is faster and the burnt area tends to increase.

Portugal ranks second from last in the European Union for the area under long-term management (close to 30%), and, in 2025 (provision data, at the date of close of this edition), it was the country where the burnt area represented the largest percentage of its territory (3.02%).

Woodlands with long term management plans in the European Union



(Source: UNECE and EFFIS)

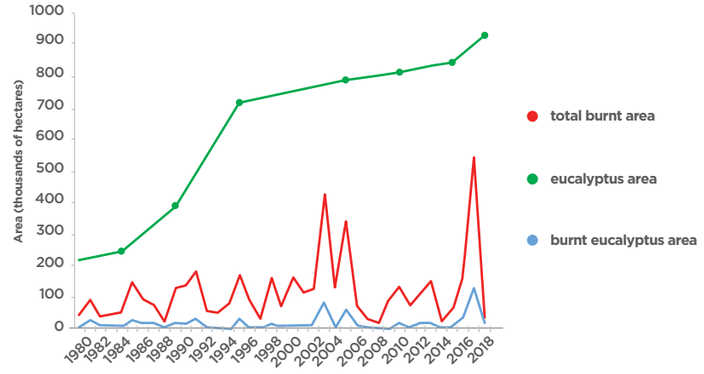
Portugal has persistently underperformed in managing its territory. Covering 3.2 million hectares, forests are the main form of land use (according to the 6th National Forest Inventory, ICNF, 2019), occupying more than a third of the land in mainland Portugal. Even so, the country ranks second from last in the European Union for the area under long-term management, and, in 2025 (provision data, at the date of close of this edition), it was the country where the burnt area represented the largest percentage of its territory (3.02%).
When woodlands are managed to prevent the risk of fire, the combustible biomass accumulating on the ground is controlled and cleared, or fire breaks are created, which serve not only to stop a fire in its tracks, but also to enable fire-fighters to access the area. When carried out in a consistent and planned manner, these measures break up expanses of fuel and substantially improve the effectiveness of fire-fighters in the field.
The importance of these risk containment practices was made clear in the in the report of the Independent Technical Commission (ITC) into the Pedrógão Grande fires in 2017, which points to the role played by forestry plantations with appropriate silviculture practices in containing the fire in certain locations.
The contrast is clear when management is lacking: the accumulation of biomass helps fires to spread, increasing their severity and hindering efforts to fight them, irrespective of the species in question.
But when fuel is properly managed in the undergrowth of forestry plantations, the fire hazard is minimised - this is the most effective form of control and prevention, able to modify the behaviour of fire, curbing its intensity and impact. The same ITC report states that, in relation to species such as maritime pine and eucalyptus, that "without fuel in their interior, instead of being a serious problem, these forests can be part of the solution".
The SGIFR document "Balanço'24 e Evolução", reporting on fires in 2024 and looking at the trends from 2018 to 2024, points to the "paradox" that has succeeded in reducing the number of fires while at the same time still accumulating fuel loads which can feed fires which are even faster, more severe and destructive.
And it states that the way to diminish this risk involves encouraging active management of the countryside by the respective landowners.
It is this absence of intervention which allows fuel to accumulate and transforms small fires into major events. This means that active management is not just a desirable option: it is a key line of defence against fire.

The added risk of climate change

The effect of climate change is to multiply the risks. Rising average temperatures, more frequent heat waves and the intensification of extreme meteorological phenomena mean that fine fuel dries out faster, prolonging the critical season and reducing the effectiveness of fire-fighting operations.
In Portugal and throughout the Mediterranean region, this tendency results in a higher probability of large-scale fires and extreme behaviour, where fire suppression resources can do little to stem the spread. By amplifying the effects of existing factors, such as abandoned land, the fragmented ownership structure and biomass accumulation, the climate risk takes forests to a new level of vulnerability.
One thing is clear from this: without management, the effects of climate change become devastating, but with management, it is possible to reduce exposure, boost resilience and mitigate the impact of major fires.

Evolution of the area of eucalyptus in mainland Portugal, total burnt area and burnt area of eucalyptus

The evolution of burnt areas has no correlation with the increase in the area of eucalyptus



Source: Adapted from Oliveira et al. 2021, with data from Devy-Vareta, 1993; Fernandes et al., 2019; ICNF, 2019; Pordata, 2020; Radich and Oliveira Baptista, 2005.





Example of a managed eucalyptus stand (left) and an unmanaged area occupied by eucalyptus (right).

Data from recent decades shows that it is wrong to blame one species in particular for the worsening fire risk.

Does the species pose a risk?

Data from recent decades shows that it is wrong to blame one species in particular for the worsening fire risk. This period coincides, on the one hand, with the expansion of eucalyptus plantations, which have triples in the past 30 years, and also with the occurrence of large-scale fires, ever more frequent in recent years. However, there is no correlation between the increase in the area of eucalyptus and the growth in the total burnt area.
From 2000 to 2022, eucalyptus plantations accounted on average for 18% of the area consumed each year by fire. In 2025, up to 31 August (when the burnt area was already the largest ever recorded in Portugal), the proportion was lower still: only 6% of the total burnt area was planted with eucalyptus, according to the preliminary SGIFR report.
Eucalyptus' smaller share of the burnt area is due to good forestry management practices in plantations of this species, in particular those operated by the industry on its own estates, but also those practices incentivised by the same industry on private holdings and in producers' organisations, through training and support for prevention of wildfires, thereby reducing the respective risk.
The difference between managed and unmanaged forests is obvious when we compare areas in which the same species predominates. In the case of eucalyptus, plantations under management present greater capacity for resistance and containment, whilst abandoned and uncared for areas are much

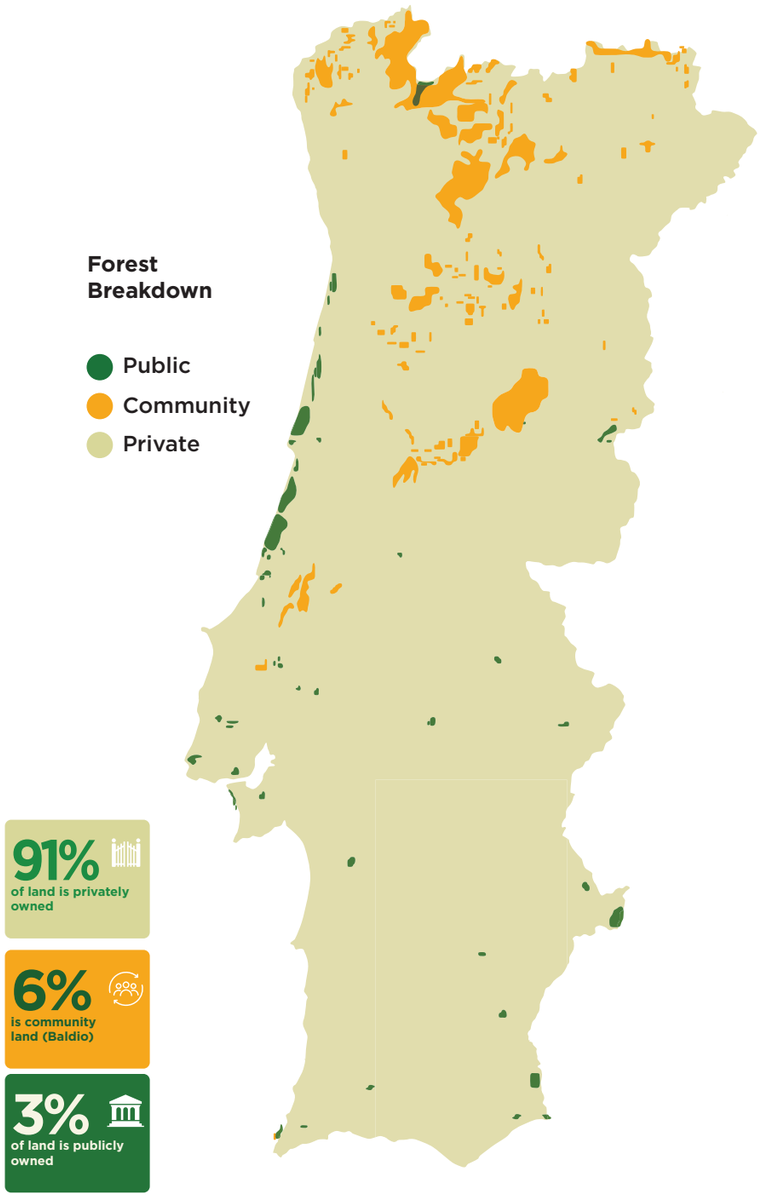
more exposed to fire. It should be stressed that, when the fire attains a high level of intensity and a certain dimension, no species is immune. But it is precisely because it performs a crucial role in preventing fire from reaching this point that management (or the lack of it) is a core factor in the wildfire risk.

The demographic risk posed by the rural exodus and ageing

Forests cover around one third of Portugal's territory. Last year, the forestry sector accounted for 8.1% of Portuguese exports, worth 6 451 million euros. In other words, forests remain one of the pillars of the Portuguese economy, in terms of both the area they occupy and the value they generate.

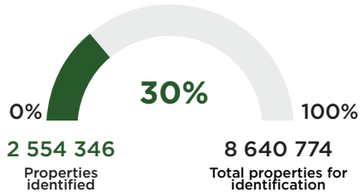
Alongside this, the country has been undergoing radical demographic change. A significant part of the population which previous lived in interior regions, close to the countryside, has moved to coastal areas, in line with the shift towards the service sector and the gradual move away from agricultural and forestry labour. According to Statistics Portugal, a quarter of Portugal's population is now concentrated in ten coastal municipalities, out of a total of 278 municipalities in mainland Portugal. Depopulation has been accompanied by widespread ageing. In 2024, Statistics Portugal reported that the country's ageing index stood at 192.4 elderly for each 100 young people. This combination - depopulation and ageing - has drained vitality from the interior and added to the difficulties of managing the countryside. Less people means less manpower available, less spontaneous surveillance and less capacity to maintain continuous

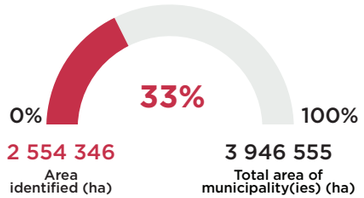
Rural land ownership in Portugal



Source: Forest Intervention Plan 2025-2050

Property registry





Sources: Forest Intervention Plan 2025-2050

As long as woodlands remain fragmented, offering poor returns and difficult to managed on an individual basis, the risk of fire will remain high.

forest management practices. The consequences of these demographic movements are also reflected in the political weight carried by these regions. In the parliamentary elections in 2025, the districts of Bragança, Castelo Branco, Évora, Guarda, Portalegre, Vila Real and Viseu together elected 28 Members of Parliament, out of a total of 230 sitting in the country's legislature. This reduced political punching power limits their ability to influence public policies that might stem the rural exodus, reduce risk factors and boost the resilience of Portuguese forests.

The risk of fragmented ownership and of poor economic returns

A very significant factor in the abandonment and failure to care for the countryside is the very low expectations of returns offered to landowners. Estimates point to the existence of approximately 400 thousand rural properties in Portugal, in an ownership structure dominated by smallholdings, especially north of the Tagus; 97% of the country's woodlands are privately or community owned. For most of these modest properties, management represents more of a cost than an investment with a return. Landowners' associations are a way of turning this situation around. Trial schemes in progress show that joint management can generate gains of scale, facilitate forest certification and develop the value of ecosystem services, thereby creating an additional income and motivation for management. However, this model still faces significant obstacles: the lack of up-to-date land registers, red tape and the lack of flexibility in the law all limit the expansion of these schemes.

In its report "Balanço'24 e Evolução (2018-2024)", the SGIFR recognises the need for the state to play a fuller role in regulating forestry resources, suggesting that landowners be mobilised to have their assets jointly managed on a larger scale, support by funds from PT2023 and the CAP. The conclusion is clear: as long as woodlands remain fragmented, offering poor returns and difficult to managed on an individual basis, the risk of fire will remain high. Only increased cooperation between landowners, supported by effective public policies, can transform today's structure of smallholdings into forests which are economically viable and therefore more resilient to fire.

In addition to the fragmented ownership structure, the degradation of many woodland areas in recent decades has resulted in a drop in yields. This is a paradox: the scientific and technological expertise available has the potential to bring significant gains, but abandonment has caused land to lose value while the fire risk has increased. In order to turn this situation around, we need economic models that make forests profitable once more, remunerating not only the products sought by the market, but also the public benefits they provide to society. If forests are not valued in this way, it will be hard to create the incentives needed for landowners and managers to invest consistently in their woodlands. ●

“Why not abandon it?”

By Henrique Pereira dos Santos, Landscape architect

The title of this article is take from a quotation from António de Oliveira Salazar, from his thesis “The cereal farming question: wheat”, 1916.
“So that this country of vineyards and olive trees, of magnificent fruit and previous flowers, able to send to the great markets, several days in advance, the most costly and rarest produce, most eagerly sought and consumed, clings to the misery of its cereal farming. Why not abandon it?”
A discussion of cereal farming does not concern me here, but rather the fact that Salazar was later to be politically responsible for the wheat campaign.
How can we explain the distance between his ideas as a student, set out in the thesis from which I take the quotation, which is a fierce critique of the policy protecting cereal farming which Elvino de Brito rolled out in the late nineteenth century, and his own actions as a politician?
The fact is that reality will always impose itself, as and when it sees fit.
This principle should be central to our debate about how to manage fire, so that we avoid wasting time and resources on things of little relevance, such as ignitions (one ignition alone was enough to give us a burnt area of 60 thousand hectares, this year, and less than twenty ignitions appear to have given rise to a burnt area more than 200 thousand hectares, very probably), administrative land use planning, the ownership structure and the like.

What we know about managing fire is that major fires depend essentially on the weather (above all the wind and humidity) and the quantity and structure of fine fuel.
In extreme weather conditions, those in which the largest part of the annual area is burnt, the efficacy fire-fighting is relative, because the advance of the fire overwhelms the capacity of suppression.
This being so, and knowing that we are unable to have a useful impact on other factors, why are we not able to manage the quantity and structure of fine fuel?
In essence, for the same reasons that led Salazar not to abandon the policies protecting cereal production: the circumstances in which Salazar wrote his thesis in 1916 were not the same ten to twelve years later, when Europe was turning towards nationalism and the prospect of war forced him to consider other ways of supplying the country with food.
For centuries, farming and pastoralism managed the highly productive lands of the north-west of the Iberian peninsula, using fire as a essential tool for avoiding wildfires. This form of management was always difficult and unrewarding, but has today become a burden on the operating accounts of ventures which are able to manage the fine combustible matter.
In these circumstances, there are three rational market hypotheses. The most common is to abandon the land, and consequently the ties that bind the owner to the land, giving rise to devaluation which will be reflected in the lack of interest in exercising property rights (the ownership structure reflects the economy, and does not imperatively shape it).
In other cases, the producer adapts to wildfires, migrating to an extractive economy, which reduces management costs, diminishing yields, for the sake of a bottom line which comes close to a profit, due to the absence of management expenditure.
Management continues, or is stepped up, when the result of operating the land manages to be positive, even while absorbing the high costs of managing fine combustible matter.
If we want to take back control over fires, we need to improve our fire-fighting by making it more professional and more intelligent, which means a type of fire-fighting that is able to create and exploit opportunities (over the year or during the course of a fire), based on a landscape where the opportunities are multiple.
I do not believe this can be done other than with taxpayers footing the bill for the service they want the economy to provide, by co-funding the management of fine fuel.
It is doubtless a very poor solution and fails to resolve the whole problem, but it has two significant features: it is easy to implement and there is no other solution that can produce results as quickly and effectively. ●



Biomass: from threat to solution

By Clemente Pedro Nunes, Full professor, Instituto Superior Técnico

The tragic forest fires of June and October 2017, in which more than a hundred perished, were a body blow to the civic conscience of all Portuguese citizens.
It was this "civic shock" that led the country's president, Marcelo Rebelo de Sousa, to celebrate Portugal's national day in 2024 in the three municipalities where the terrible events of 2017 took place - Pedrogão Grande, Figueiró dos Vinhos and Castanheira de Pera - and also led to the creation of the Ministry of Territorial Cohesion.
But since then, unfortunately, public policies have done nothing in practice to promote the economic development, social cohesion and the actual safety of those who live work and invest in the Portugal's rural interior.
Strategic measures to address the causes of wildfires have to be an absolute priority for any responsible government of this country.
And that priority has to be pursued in cooperation with the population and the smallholders who own the land in the interior, and never against them!
The policy followed since 2017 of penalising these populations with administrative fines and even more "bureaucratic terrorism" is a serious error and is merely counter-productive.
Because in practice it only accelerates the rural exodus
In order to tackle wildfires effectively, the government has to act on three fronts:
Tighten the law on the crime of rural arson, so that no criminal can walk free from the court with only a suspended sentence.
What happened in September 2024, when in just three days there were more than a thousand night-time ignitions, is a stark example of the need for decisive action to prevent and punish criminal acts.
Wildfires caused by arsonists are an outrage, as they cause widespread devastation to people's lives, the economy and the environment.
We cannot forget that forests are our "largest carbon sink" and that wildfire cause a massive increase in CO2 emissions.
Create logistical systems for collecting and storing surplus rural biomass.
It is these new logistics that will make it possible to assign value to this biomass and avoid it remaining on the ground, where it facilitates the spread of fires.
The consequent use of this biomass for energy, in power generation facilities under the FIRMe scheme, is of the greatest importance.
This renewable electricity is a way of compensating for the intermittent nature of wind and solar power, and, as such, is of great economic importance to Portugal.
The first step towards setting up the new logistical systems for economically viable collection and storage of rural biomass is to create the Biomass Parks, also known as Forest Recycling Centres, in all municipalities with a high density of forest cover, where landowners can deposit their biomass, and receive immediate payment, so as to recover the harvesting and transport costs they have incurred.
Funding for these Biomass Parks will have to come from the Environmental Fund, as this is a very effective way of curbing the spread of wildfires and their consequent CO2 emissions.
These Biomass Parks are also essential for sorting the materials, enabling them to be separated and then for different types of biomass to be set for economically optimised uses in each case: burning in recovery boilers or power stations; raw materials for producers of pellets or chipboard, cellulose and furniture; composting or generation of biomethane.

Strategic measures to address the causes of wildfires have to be pursued in cooperation with the population and the smallholders who own the land in the interior, and never against them.



In what will be a mutually advantageous public-private partnership, it will be possible to make management of agro-forestry smallholdings economically viable, at the same time as boosting the whole downstream industrial sector.
If these Biomass Parks are properly managed, the biomass from the rural interior will become an opportunity for optimised supply of raw materials to a vast number of industrial sectors, at the same time as ceasing to be a permanent threat of summer tragedies, which for more than twenty-five years have been seriously tormenting the population of huge areas of Portugal.
It should be stressed that the Ministry of the Environment and Energy has already publicly announced two steps in the right direction:
On 23 April 2025, funding of 1.5 million euros was announced for new Forest Recycling Centres in 11 municipalities with a high density of forest: Tábua, Soure, Paredes, Mangualde, Anadia, Vila Nova de Poiares, Vila de Rei, Castelo Branco, Boticas, Paços de Ferreira and Sertã;
On 26 July 2025 it was announced that PNGIFR (National Integrated Wildfire Management Plan) would include funding of 2 million euros for the construction of six small biomass power stations in the municipalities of Boticas, Pampilhosa da Serra, Arganil, Góis, Vila Pouca de Aguiar and Silves.
Although the funding announced on both occasions was only a drop in the ocean, the essential thing is to ensure that these projects are now implemented rapidly, so they can serve as an incentive for a new forest management dynamic in the three pillars of sustainability: economic, social and environmental.
Implementation of these two capital projects will make it possible to optimise technologies and logistical chain throughout the biomass sector, creating more specialist employment in these rural areas.
And it will serve as an example for other larger and more impactful projects that can follow, able to form the foundation for real economic and social cohesion throughout Portugal's inland territory.



We are moving into an era when abandoned tracts of the countryside, or with very low levels of management, are essentially fires waiting to happen.

Fires everywhere and all at once

By Miguel Miranda, Executive Director of the Air Centre and former chairman of IPMA

The summer of twenty twenty-five brought an early heat wave which engulfed Europe in the hottest June on record, far in excess of the highest temperatures previously recorded in two thousand and three. Many places experienced temperatures above 30 °C and in the Alentejo, more precisely, at the weather station in Mora, a new all-time record was set, at almost 47 °C. July on the continent was dry, with typical summer weather dominated by anticyclones in the Atlantic and clear skies. But there were two episodes of hot weather in the first and last week, ending with nearly seventy per cent of the territory experiencing meteorological drought.
In late July, it could be seen that August would see the situation worsen again. The media carried widespread warnings of hotter weather to come, with temperatures close to 45 °C and tropical nights. Although record-breaking temperatures were not anticipated, the forecast was for thermometers to show more than 40 °C over a very wide area, in the centre and north.
For more than a week, the very hot weather took up the entire forecast and it seemed it would never end. In the end, IPMA assessed this extreme episode as lasting 17 days, classifying it as the longest ever.
In the wake of two years marked by rainy winters with periods of heavy precipitation, bringing a long drought to an end, the plant cover was particularly well developed. After two hot and dry months, other than areas where woodlands are subject to real and continuous management, all the elements were in place for a very high risk of forest fires. It was not hard to predict that August twenty twenty-five would bring devastation.
The meteorological risk indexes for forest fires were at the highest levels, consistently and for weeks, over a very wide area of territory. Although fire-fighting strategies have evolved, thanks to the efforts of all the actors in the civil protection system, and of AGIF in particular, they found themselves facing a situation where the probability of a large fire being triggered or developing was high in almost all areas of mainland Portugal. There was no let-up. No time for anyone to rest. Fire everywhere and all at once.
In late July, the short and longer term forecasts for Portugal, covering well over ten days, pointed to what should be expected. The information circulated widely and was analysed in the media, and undoubtedly in civil protection circles.
Over the days of the hot weather, and even now in early autumn, television reporters have been everywhere, often getting there before the civil protection authorities. And they show that the local people are missing something, that they feel abandoned as they struggle to no avail against the encroaching fires, waiting for the fire brigades which cannot be everywhere they are needed at the same time. The illusion of a system able to stop all forest fires before they take hold proved to be just that: an illusion.
None of this could be considered a surprise. Surface temperatures continue to rise, slowly but inexorably, all over the planet. At our latitude, and throughout the Mediterranean basin, land is becoming more arid due to the combined action of increased evapotranspiration and very erratic rainfall.
Further periods of “exceptionally hot weather”, long and affecting wide areas, will come in future. Always incompatible with the landscape of what is also an Atlantic country. We are moving into an era when abandoned tracts of the countryside, or with very low levels of management, are essentially fires waiting to happen An age in which summer fires, even when combated by a generous resources on the ground and in the air, attain such a scale that they rip through farmland, peri-urban and industrial areas, or ancient forests. In which the population cannot always rely on the forces which are supposed to defend them arriving on time.
Either we actually manage our territory all year round, or nothing is really safe. ●

Forests: a tragedy foretold, a reform postponed

By Carlos Lobo, Professor of the School of Law of the University of Lisbon

We all know! There is not a single political decision-maker, local councillor, forestry officer, fireman or citizen paying the slightest attention to the news who does not know the truth: for decades, Portugal has been sitting on a barrel of gunpowder otherwise known as its woodlands. Large-scale fires are not “natural disasters” - they are the foreseeable consequence of a fragmented land ownership system, ineffective forestry policies and unacceptable paralysis on the part of the State. It’s the chronicle of a tragedy foretold. And year after year, nothing changes.

The problems have long been identified! The causes too: tiny smallholdings, the lack of a working land register, voluntary management schemes (ZIF, AIGP and so on) unable to create critical mass, a lack of accountability, and a tax system that rewards owners for abandoning their land, rather than for actively managing it. All this is joined by the bankruptcy of a public funding model which, in essence, funds reactions (aircraft, fire-fighting, repair of the damage) instead of investing in the only structural solution: prevention, through integrated, large scale management.

This is the true failure of the State! To know of the risk, to understand its causes, and even so to reject making structural changes. It is a silent abdication from its essential function, of protecting persons, property and ecosystems, due to a lack of political courage to address a problem of the critical dimension of land ownership, from fear of a peasants’ revolt, like that led by Maria da Fonte in the nineteenth century, whose ghost apparently still spooks the Portuguese authorities.

The only credible response is a Forest Regime 2.0: a management model which is pro-active, coercive at its base, making it possible to combine holdings into larger areas of forest, and then manage and operate them sustainably. The aim is not State ownership of forests, but to impose a compulsory minimum level of management on those unwilling or unable to assure it.

The procedure is simple: automatic inclusion of properties in collective management plans, with the right of refusal only for those who, identified in the land register, present their own plan and actually execute the required operations. Those who do not manage their land, pay - via the fire risk levy - and see the proceeds of this levy invested in prevention and rehabilitation.

Priority should be given to high-risk areas where individual management is less feasible, using risk maps and feasibility studies for the purpose of demarcation.

Management of these areas would fall to business vehicles, jointly owned by the landowners, industry and the State, able to generate economies of scale, attract private investment and enjoy access to carbon credit markets. Heavy machinery that would operate without the artificial barriers of ownership rights which are not exercised, and so socially harmful.

There is no attack here on private property, but merely optimised management at a scale that makes the territory viable.

Nostalgia for the old State forestry services is understandable, but unrealistic.

The reality demands robust public-private partnerships, with concession agreements that define rights, duties, performance indicators and clear penalties. Concession holders would enjoy tax breaks if they exceed sustainability standards, as well as access to carbon markets and profit sharing with the landowners.

The funding could come from green bonds, forest investment funds and consignment of fiscal revenues from the sector itself (Ricardian model), creating a virtuous circle of sustainability. Technology - drones, satellites, artificial intelligence - would enable real-time monitoring of management, thereby preventing risks.

The way rural land is currently taxed is an invitation to abandon it: municipal property tax on rural land represents only 0.5% of total property tax and fails to penalise inaction. A new assessment model is needed based on the potential productive value of the land, rewarding those who work the land and penalising those who leave it untended. Those who manage, pay no municipal property tax; those who abandon the land pay more - much more.

The solutions have been identified. They are set out in official reports, draft legislation and technical plans. What is lacking is the political will to transform what is “voluntary” into “action through the right incentives”, and what is “recommended” to what is “executed”.

What is lacking is determination to break away from the institutional paralysis which turns each fire into a spectacle of uproar and each autumn into a return to indifference.

What we have is not a forest without an owner. It is a State ignorant about its territory

While we delay, the country burns. Lives are lost, along with homes, ecosystems and economic opportunities. The real cost of this inaction is measured in hectares burnt, villages emptied of their inhabitants and desertified soils.

And above all, in the certainty that next summer - or the one after - we will repeat the ritual of tragedy.

The question is no longer technical or financial. It is political and moral: how long will we allow the State to fail, knowing that it will fail?

If we do nothing, everything will burn... over and over!



The reality demands public-private partnerships, with contracts that define rights, duties, performance indicators and clear penalties.



The conservatism and complacency which leave nature to its own devices and the freedom of movement enjoyed by criminal arsonists have to end.

“We need a joint rehabilitation plan for each large area burnt”

By José Ribau Esteves, Mayor of Aveiro (2013-2025)

Successive governments have failed to take a position able to change the reality of the chronic disease of fire which has cyclically affected the country as a whole, to varying degrees. There are plenty of culprits but no reforming action capable for ending the problem or significantly reducing its territorial scale each year.
What we urgently need is ACTION.
I believe the main risks can be combated on three fronts.

Prevention
Forests and woodlands have to have people, economic activities, fire breaks of an effective size and active year-round surveillance.
The conservatism and complacency which leave nature to its own devices and the freedom of movement enjoyed by criminal arsonists have to end.
A significant portion of the fire-fighters and fire-fighting equipment have to be in those areas on surveillance duty and preparing the land to reduce the fire risk and increase its resilience.
The ICNF should be closed down, nature management and conservation should be taken over by the Portuguese Environment Agency, which already managed the National Ecological reserve, and we should again have a Directorate-General for Forests (misguidedly wound up in 2006), with the capacity needed to manage the territory, including at the operational level, structured at the NUT II (regional) level, functionally coordinated with NUT III (inter-municipal and similar) authorities.
The licensing and construction of Biomass Power Plants, with the minimum critical dimension and contracts for reception of biomass from neighbouring forest areas, will make a positive contribution to generating revenues to pay the expenses of clearing fuel from forest land.

Fire-fighting
There is an urgent need to completely redesign the command structure and fire-fighting operations. There are too many different organisations: the Fire Brigades of the so-called Voluntary Associations and Forest Fire Brigades, the Police Fire Brigade, the ICNF Fire Brigfade, a National Emergency and Civil Protection Authority which spends too much time in offices, away from the field, AGIF which is no use at all, and many other organisational problems.
Portugal has to have its own aerial resources (light, medium and heavy), operated by the Portuguese Air Force, which as well as fighting fires carry out surveillance and provide early warnings of emissions, with immediate deployment of fire-fighting resources.
Although mayors are in charge of civil protection in their municipality, they have no powers over the management of resources and operations, which is wrong and a waste of their abilities and knowledge; this needs to be corrected.
The organisations and resources should be located around the country in line with the level of risk and should have very short ignition reaction times;
land and aerial resources need to be coordinated.

The Courts
Defendants accused of arson need to be brought quickly to trial and the penalties must be more severe - longer sentences without the possibility of parole. Penalties should include working in woodlands and forests, on clearing undergrowth, building and maintaining fire breaks, and other tasks.

Final Note
At this time of the year when the fires have stopped, there is an urgent need for clear-sighted planning, designed around medium and long term priorities, but with immediate action to reform operations, so that we can start to feel the results in 2026. ●

THREE QUESTIONS FOR...

Nuno Guiomar, Researcher at the Mediterranean Institute for Agriculture, Environment and Development, and at the Associate Laboratory CHANGE, University of Évora

"Fire should be central to all decision-making processes in territorial matters"

What are the main structural risk factors in the territory in Portugal?
Fuel is at the top of the pyramid. In territories where fuel accumulates vertically and horizontally, the fire regime is almost solely commanded by the weather. This accumulation is the result of the land being abandoned, or at least of a very low intensity of use, and is not a phenomenon restricted to the agricultural sector, as is often put about (in many places, forestry activities consist merely of extraction). In burnt areas, the fuel complex is even more likely to generate fires that challenge the capacity of suppression resources. Forest stands affected by fire generally have a lower dominant height and a smaller basal area, in many cases with different with different well-developed vegetation layers, featuring different species. The behaviour of fire in these circumstances is not comparable with that which can be expected in an adult stand with active management. In addition, this dynamic is accentuated in low-yield territories, particularly those with a more rugged relief, considerably increasing the potential for fire propagation. Lastly, our suppression model continues to marginalise work in the field that goes beyond the immediate perimeter of settlements or infrastructures; outside these areas the tendency is to wait and see, and many opportunities for combating fires effectively and safely are missed. Although the story we hear told points to failings in prevention, 2025 offer plentiful examples that contradict this.

What should the absolute priority be for the next five years?
Five years is not enough for large-scale plans. I would say that it is imperative to publish the regulations on prescribed fires, and to identify the areas where these can already be used. The second priority would be to invert the tendency to marginalise the uplands livestock sector, which has an extremely important role to play in managing vegetation, both through the use of fire and through the use of the land by the animals. This means adopting higher standards in participative and collaborative processes. It is vital in this case to integrate the interests of shepherds and farmers in the decision-making process, and to work with them to identify the constraints on use which lie behind the abandonment of this type of farming. The design of credit facilities for the sector should consider the specific features of upland pasturage systems, so that the areas where management is most urgently needed are not excluded due to not meeting the eligibility criteria. Abandonment also affects woodlands, exposing areas with active management to very severe fires. It would be useful to require management measures at the end of the forestry cycle, so as to prepare the land for reforestation or to convert it to a different use or function. Fire should not be merely a sub-chapter in the plans, it should be central to all decision-making processes on territorial matters. The fourth priority will be design schemes to remunerate those who manage fuel, and to regard this management activity as a landscape service offering protection against wildfires.



How can management be made viable on land divided into smallholdings?
We have tried different approaches to encouraging collective management. We should not abandon these initiatives, but the real problem is not in the ownership structures, but in what can be obtained from the land. A large area with low fertility soil will certainly be a bigger problem for the owner than a small area with the same characteristics. The management bodies for forestry intervention zones and association lack economic capital, but they have skilled human resources. One idea might be to channel forest compensation schemes, resulting from deforestation, to other uses considered to be of public interest in collective management areas with approved Forest Management Plans. These compensation schemes should be reviewed, because they should not only entail the initial investment in forestation of the area to be compensated, and should also include payment of management until the new stand attains the maturity of the area felled. ●

"Fire should not be just a sub-chapter in plans. It should be central to all decision-making processes on territorial matters."

THREE QUESTIONS FOR...

Luís Sarabando, Technical Director of the Lower Vouga Forestry Association

"Society needs to recognise the forest as a pillar of the country"

What are the main structural risk factors in the territory in Portugal? ?

In my opinion, Portugal faces three central challenges which structurally weaken its territory,.

The first is the lack of real land use planning, able to guarantee diversified and resilient mosaic landscapes, with unbroken tracts of forests no greater than 5 000 hectares. This mosaic structure could be achieved by introducing pasturage or other farming uses, rehabilitation of the ecological structure on valley floors, as well as creating of natural structures, such as bodies of water, or artificial structures, such as fuel management strips and communication networks.

The second risk has to do with the low levels of territorial management, due to the poor returns from rural activities and the consequent rural exodus, which has left vast areas of abandoned countryside.

Lastly, the reality of smallholdings which, in the current socio-economic context, is hard to conciliate with efficient management of woodlands.

What should the absolute priority be for the next five years?

The absolute priority should be clear and unambiguous public recognition of the fact that forests and the countryside are fundamental pillars for Portugal's security, economy and cohesion. Only consistent and lasting public policies - supported by their own funding package, thereby guaranteeing predictability in the medium term and not merely dependent on the volatility of foreign funding - can create the foundations for a real transformation of our woodlands and countryside.

As essential measures, I would stress: dividing the territory on a mosaic basis, using natural and artificial solutions to avoid unbroken stretches of hazard-prone land; an ownership structure based on larger scale models, able to ensure professional and efficient management; and remuneration for ecosystem services, recognising the environmental and social benefits which those managing the countryside provide to society, currently for no reward, given that this is the only way to make investment in forestry economically viable.

In order to implement these measures, the State needs to reassert its authority, so that action can be taken in the collective interest, in particular by resolving the issue of ownership of rural properties and decision-making powers over their management. Because this is an indispensable step, it should logically be taken with full respect for private ownership rights and for owners, just as happens in major infrastructure projects and public works.

How can management be made viable on land divided into smallholdings?

In order for management to be feasible in fragmented territories, owners must be able to obtain income from forests. This entails introducing innovative and collaborative solutions, based on combined management models which increase the working dimension of plots, permitting mechanisation, reducing costs and securing economies of scale, especially in production forests of pine and eucalyptus. But protection or conservation forests also require to scale in order to access public funding or emerging markets, such as those for ecosystem services or carbon sequestration.

With its Combined Forestry Areas, the Lower Vouga Forestry Association has shown that this is possible: each owner has a share proportional to his area, and shares in the investment and benefits. Experience has shown that this is the way forward, despite the cultural difficulties and slowness of the process.

We believe that with institutional support - legal, technical and financial - it will be possible to consolidate these models, resulting in woodlands which are better balanced, valued and protected. By the end of 2025, 11 projects will be under way, covering 180 hectares and involving around 150 landowners and 150 rural properties.

In order for these examples, and others in different regions, to be implemented, it is essential for the country and economic actors to recognise and value the role of Forestry Producers' Organisations, supporting them in their work in the field with communities and the territory. For landowners to sign up to these schemes, there needs to be mediation, technical monitoring and, above all, trust - built over time, by working closely with local people and speaking their language. ●



"In order for management to be feasible in fragmented territories, owners must be able to obtain income from forests."



THREE QUESTIONS FOR...

João Baeta Henriques
Landowner and forestry producer, founder of Serforal

“Managing fragmented territories is a challenge comparable to drinking from a glass after it’s shattered into pieces”

What are the main structural risk factors in the territory in Portugal?
As regards the wildfire risk in Portugal,. especially on the basis of analysis of the large-scale fires that started to emerge in the nineteen seventies and which, in the last decade, have grown in size and degree of hazard, it’s possible to identity three crucial structural factors. The first is the abandonment of rural and wooded land, particularly in areas where land is divided into smallholdings, representing 80% of the territory in some regions. The next is the scarcity of properly trained and professionalised human resources for fighting wildfires - a response that should not be limited to protecting people and buildings, but should also encompass defending the territory. Lastly, the lack of political courage to implement public measures that rapidly and systematically address problems that have long been identified: the land ownership structure and size of holdings, the poor returns from woodlands and the lack of action by many landowners and heirs who, without suffering any penalty, leave their land uncared for.

What should the absolute priority be for the next five years?
The absolute priority should be to step up active management of the countryside not given over to farming, based on its economic, social and environmental sustainability. Portugal is too poor to let around 80% of its land with forestry potential (for either production or conservation) to lay idle.

How can management be made viable on land divided into smallholdings?
Managing fragmented territories is a challenge comparable to drinking from a glass after it’s shattered into pieces: it simply can’t be done. The current dispersion of ownership undermines any economic returns, deterring investors and potential managers of an assets offering no return. Combined management programmes, such as the Integrated Landscape Management Areas, can serve as an initial stimulus, but they face limitations: the forestry cycle is normally much longer than the duration of these programmes the next generations of owners may take a different approach, and return to a fragmented situation. In addition, these schemes are voluntary and many landowners do not take part, and do not even have their land officially registered - at present, only around 36% of land is registered. The solution is to “glue” together the fragments, enabling heirs or landowners interested in investing to acquire land, preferably neighbouring plots, from those uninterested in managing it. It is fundamental to design schemes that encourage landowners to reach a decision - through incentives, but also, if necessary, through tax measures, such as higher rates of municipal property tax - so as not to condemn the country to waiting another generation whilst, year after year, the tragedy of forest fires is repeated.

Paulo Fernandes, Researcher, UTAD

“It’s the landscape that creates fire”

Unbroken tracts of forests, unmanaged or abandoned, are what Paulo Fernandes sees as behind the increased fire risk in rural areas. Risk factors which are then amplified by climate change and adverse meteorological conditions.

Professor and researcher in the Department of Forestry Studies and Landscape Architecture at the University of Trás-os-Montes and Upper Douro, Paulo Fernandes has long experience of research in Portugal and abroad into forest fires. He was a member of the technical commissions looking into the major fires of 2017 in Portugal and in 2022 was one of the authors of the United Nations report on climate change, drawing attention to the increasing frequency and intensity of forest fires.
Speaking to My Planet, he explained the connection between fire risks, weather and land use and management, in particular activities to control combustible materials.

According to a study in which UTAD participated, coordinated by the University of Lérida, the fire risk in forested areas has increased sixfold in the past two decades. What main factors lie behind this?
The fire risk in woodlands has been heightened by climate change, manifested in the form of longer periods of more extreme drought and more adverse meteorological conditions, in particular, high temperatures, low air humidity and unstable atmospheric conditions. But it is the landscape that creates fire, and fires driven by these conditions have increasingly been made possible by the structure of the landscape: larger unbroken tracts of forests, resulting from their expansion and the loss of farmland, and also less management or even abandonment of these forests, which brings an increase in the quantity of combustible vegetation.

What are the main fire-related vulnerabilities in Portugal’s forests?
Precisely the large tracts of forests, often in areas with fire-friendly relief, and also little diversity in the composition and structure of the forest. Single-species and even-aged stands are largely predominant. The influence of these factors is reduced by appropriate management, but this is often lacking. Then there are exogenous factors, in particular the large pressure from ignitions and the fact that forests are the poor relation when it comes to fire-fighting operations.

How have these vulnerabilities evolved? Have they always been the same or are the current risks different?
This is a contemporary form of vulnerability, so to speak, and results from creating a forest landscape in a climate which is favourable for forests, but hostile to protecting them, or at least forests geared to producing wood, because this is a land use option which consists of concentrating biomass that becomes combustible in summer. The current risk is different insofar as, up to the late nineteen sixties, our fire regime was limited by the scarcity of fuel and it is currently driven by meteorological factors.

In relation to large and long lasting fires, which may be increasingly probable, what are the risk factors that call for priority action?
It is crucial to pay attention to the intersection between territory and weather forecasts, as this enables us to identify areas where extreme fires will be more likely; we can then focus on preventing ignitions and ensuring a rapid response. In the field of forest management, it is difficult to prevent these fires from progressing without creating opportunities for fire-fighting operations through strategic management of fuel and creating diversified mosaics of land use and vegetation.

In your opinion, is the public debate still highly focused on species, to the detriment of other risk factors?
Yes, you often hear the blame being laid on the species used in production forests, forgetting

RISK FACTORS





that forest management enables operators to largely compensate for the fire risk associated with this form of forestry and that other types of forest are also vulnerable when left unmanaged.

How can a fire in a given location become an added risk factor for future fires in the same location?
Large fires give rise to more homogeneous woodlands, because all the vegetation is growing simultaneously over a large area. Also, presumably, these fires tend to discourage investment and lead to more abandonment. As a result, large fires will tend to generate even larger fires in future, directly or indirectly.

Are there specific things that should be done in burnt areas, that can reduce this risk?
Large burnt areas should be seen as an opportunity for change in terms of the forest composition and structure, but the options for intervention must be shaped by the context and the management goals, such as maintaining (or increasing) the production potential or rewilding.

You mention several times the difficulty that the relief can pose to fire-fighting, enabling fires to attain a large scale, in particular in Arganil/ Lousã, not just this year, but also in previous years, such as 1987, 2005 and 2017. Given that the relief cannot be altered, what should be changed in order to minimise the risk in these areas?
Manage the fuel on a large scale and strategically, which in general means annual interventions in around 5 to 10% of the territory at risk of fire. Mountainous terrain is a barrier to access and delays the fire-fighting response, in addition to enabling fire to race through wooded slopes. This means that on days with more extreme weather, surveillance is very important, as a form of deterrence and of faster detection, along with an initial attack with heavy air resources.

Looking at the areas of prevention and fire-fighting in Portugal, which is currently most in need of attention, change and investment?
In terms of attention, both, but given that the results of prevention are only visible in the medium and long term, I believe that substantial improvements would be visible in the short term if progress were made in fire-fighting. So, change how fire-fighting works and step up investment in prevention.

Are the existing forecasting systems effective? Could they be improved, by better incorporating the different risks associated with fires?
The prediction tools which model the meteorological influence are today fairly satisfactory for our existing needs. For more specialist applications, which need to anticipate the behaviour of fire in the territory, we still lacking fuel mapping with the desirable level of resolution, which could change with the new LiDAR coverage.

How can prescribed burns (outside the fire season) help combat the size of fires?
Controlled burning reduces the quantity of fine fuel, which is what feeds the progress and energy of a fire. Research in Portugal looking at where fires have run into areas treated with prescribed burns show impressive positive impacts on the behaviour and severity of fire, and on the resilience of the vegetation. In view of the large tracts of forests requiring intervention, controlled burning should be our prime option for managing fuel. Unfortunately, it is used very little in forest stands, despite being inoffensive to trees and to the soil. In the particular case of eucalyptus, it has advantages in relation to harrowing, which is the usual practice, but which does not reduce fuel along the line of planting, meaning that it does not have the same benefit in terms of fire propagation and the impacts on trees.

As a member of the technical commissions looking into the major fires of 2017, what did we learn at that time and how did we use that information in the years that followed.
We learns a great deal about the particularly fast, intense and catastrophic fires that happened that year, and how Portugal was so unprepared to address and mitigate them. The TCI's findings were decisive in improving Portugal's wildfire management policy which, in terms of thinking and planning, is fairly progressive and often held up internationally as an example for others to follow. But we still need to put into operation and achieve a lot of what has been mapped out.

In terms of minimising the risks of forest fires, can you tell us the main advice you gave in September to the Minister for the Environment and Energy and to the Secretary of State for the Environment?
It was a fairly informal conversation, in line with what I've said in response to your questions. In particular, I stressed how prevention and fire-fighting activities are complementary and interdependent, and the critical need to improve strategic aspects of fire suppression operations, without which the investment and progress achieved in managing fuel would not bear fruit. ●



Correct management, even in single species stands, helps to reduce the risk and facilitate fire-fighting.

"It is difficult to prevent these fires from progressing without creating opportunities for fire-fighting operations through strategic management of fuel and creating diversified mosaics of land use and vegetation"

THE ANSWERS EXIST

When forests are managed, fire loses ground. All over Portugal, examples abound of forests which are more resilient because they are actively cared for, planned and valued. The answers exist and lie in factors that depend on us. We have no control over the climate or the relief, but we can control how we manage the territory and the technology we develop to help us. The difference between a vulnerable forest and a resilient forests starts here.

When the forest is organised, fire is less potent

Being there instead of moving away, active management, joining together fragmented plots, investing in the community, gains in scale and valuing woodlands. These are not abstract concepts: they are strategies which, in the field, make forests more resistant to fire, more profitable and able to preserve their ecosystem services.
This is the way to transform our forests, from a problem into a solution.



For those whose only knowledge of Portugal's forests is from the dramatic footage on television each summer, it is easy to think of them as a homogeneous block. But that is not the reality.
The forest is not one large area: it is made of thousands of separate and fragmented properties, managed in very different ways. The differences between them extend far beyond the species of the trees. In some forests, management models have been adopted which are able to contribute decisively to preventing fires, or at least mitigating their severity and size. In other words, specific strategies have been rolled out in the field to counter the sense of fatalism that returns year after year, as if 'burning' or 'letting the forest burn' were somehow inevitable. The problem is not the lack of expertise or ideas, but rather that their application is limited, in a landscape where smallholdings are the norm and active management remains the exception.

The answer that makes a difference
Transforming this exception into the rule is the real challenge. Active management is not just one of several answers - it is the answer, as all the others involve creating conditions in which a larger area of forests can benefit from this approach. "The way we manage the forest is the only variable we can control, of all those which can affect the number and severity of fires", says Sérgio Maggiolli, coordinator of The Navigator Company's Forestry Protection services. "The territory, the lie of the land, the relief or the meteorological conditions are out of our hands. But, through active management, we can have a significant impact. And this is valid for any production species", he adds.
In the case of eucalyptus production forests, operated by industry, the active management that Sérgio Maggiolli speaks of is professional care, based on scientific know-how, over the whole growth cycle of the trees. It starts long before there is any need to control combustible materials in the forest undergrowth. It actually starts well before there is even a forest, At the planning stage of a new forest stand, keys issues need to be considered, such as:
- The road network - ensuring it is sufficient for management needs, with turning points and entry and exit points for the properties.
- Networks of fire breaks - areas cleared of vegetation, which serve to protect the forest.

Sustainable active management therefore entails having a series of infrastructures designed to facilitate access to the areas under management, in the event of need. "Countless times, over the summer, the news reports about the fire-fighting efforts spoke of the difficulties caused by the lack of access roads in some places. On well managed properties, that doesn't happen", Sérgio Maggiolli assured us.
He went on to explain how all forest maintenance operations contribute to reducing the fire risk. From fuel management, through harrowing, to clearing undergrowth, thinning operations and selection of saplings, everything has a preventive effect in relation to fires. Including a replanting, after felling the previous trees: "At that moment we are creating an area with much less fuel, in other words, a break in the wider forest structure, which is important for prevention. Even if it's the same species, we're still creating a mosaic", explains Sérgio Maggiolli.

The Portuguese forest is not one large area: it is made of thousands of separate and fragmented properties, managed in very different ways.

How to promote management in fragmented territory?
If active management is the main answer, the truth is that it is far from being applied across the whole landscape. Several factors stand in the way of implementation, leading more owners to abandon their land, multiplying the risks and hindering prevention and fire-fighting efforts. One of these factors is the organisation of the territory: land ownership in Portugal is highly fragmented, and holdings of less than two hectares are common. The fact that 97% of the country's forest land (including baldios, or common land) is in private hands makes the situation yet more difficult. Added to this is the ageing of the rural population, the exodus to the cities and coastal regions, the lack of manpower and the poor economic returns from small-scale forestry. The reality is that, on a small holding, active management is difficult or even unfeasible. It was in response to precisely this difficulty that initiatives have been started up for joint management in areas divided into multiple smallholdings.
Forestry Intervention Zones (ZIFs, in the Portuguese acronym) are the country's largest initiative for combined management of smallholdings, set up after the major fires of 2003 and 2005. These are unbroken and demarcated areas of territory, subject to a Forestry Management Plan and a Specific Intervention Plan, and administered by a single management body. In July 2024, according to ICNF, there were 287 ZIFs, covering more than two million hectares and approximately 32 thousand members (the latest published figures). In the wake of the fires in 2017, a new scheme for combined management was designed: the Integrated Landscape Management Areas (AIGP). With better funding that the ZIFs and a tighter regulatory framework, they promised a more effective response. In 2024, 70 AIGPs has been formalised and 62 Integrated Landscape Management Operations (OIGPs) approved, which are the intervention plans to be implemented in each AIGP.

The role of forestry associations in combined management
Despite the good intentions, both the ZIFs and the AIGPs have attracted criticism for their excessive red tape and strict technical requirements, which have deterred landowners from signing up and undermined their success. Especially when we consider that smallholders are typically older, have low levels of educational attainment, and live in isolated areas. Other more flexible responses have accordingly grown up, more attuned to the landowners. One of these is the Combined Forestry Areas (AFA) organised by local associations. The Lower Vouga Forestry Association (AFBV) is a successful example: after giving up on attempts to set up a ZIF, it focused instead on AFAs, which have enabled it to consolidate small units jointly managed by neighbouring landowners. The first was formed in Castanheira do Vouga, in 2016, with around 11 hectares and 13 owners. The experiment has been replicated several times, resulting in an average increase in yields, in the case of eucalyptus, of around 60%. By the end of 2025, the AFBV aims to have 13 AFAs, with a total of 180 hectares and involving approximately 150 landowners.
The Atlantis Forest Organisation (OFA) has set up a scheme of Joint Management Units (UGCs), to support small and medium-sized landowners, promoting an economically viable approach. The UGCs provide technical and operational support through the production cycle, and their eucalyptus plantations enjoy financial and logistical support from The Navigator Company. The project also includes other production species, as well as conservation areas. The model is based on voluntary cooperation, without giving up ownership: individual ownership is maintained, but joint management brings scale and efficiency gains. The average size of holdings is around 2 000 m2. From 2023 to early 2025, the total area under management rose from 70 to 850 hectares.
There is no perfect system, but there is no lack of schemes for managing and organising land. The challenge is to replicate them and increase the area of well-managed forests, reducing the areas of abandoned and vulnerable forest. So that, when summer comes round, it won't be all bad news. ●



Active management puts up barriers to fire.

Fire-fighting opportunities created by the forest mosaic

A forest mosaic model breaks up the landscape, providing valuable opportunities for halting fires. This is one of the pillars of active management, as regards prevention. And these breaks do not necessarily entail planting different species: they can be created by alternating stands of different ages. When fire encounters adult trees, it behaves in one way; when it enters an area with very young trees, without any associated vegetation, its intensity is drastically reduced, and in many cases it will simply die out. In other situations, these young stands function as opportunities for fighting the fire more efficiently and safely. The same principle applies to the transition between an unmanaged area, full of fuel, and an area cleared of undergrowth and provided with fire breaks: areas like this often provide an opportunity for halting the advance of the flames. ●

There is no lack of forest management schemes: the challenge is to replicate and multiply them.

Valuing biomass means valuing the forest

Assigning value to waste materials from forestry operations is consistent with the logic of a circular economy, central to the new paradigm of the forest-based bioeconomy. At the same time, it functions as a tool for preventing fires, because to remove this waste material is to remove fuel load from the forest.
There are plenty of opportunities for using forestry biomass as a raw material for bio-based products, such as biomaterials, biofuels and energy. For example, it can substitute cereal starches and food oils in producing bioplastics and biofuels, reducing the pressure on farmland for non-food purposes.
The Navigator Company's R&D centre - RAIZ - has invested in developing these solutions. Biomass is also a pillar of the energy transition at the company's industrial complexes: at the three pulp mills, high efficiency co-generation enables the company to produce renewable electricity from biomass. In addition, two biomass power plants inject renewable power into the national grid. In 2024, Navigator accounted for 34% of electricity generated in Portugal from biomass. By exploiting waste forestry biomass for energy, the industry reclaims this resource and, at the same time, helps to protect forests against fire.
A public programme for "Local power generation in small biomass power plants", financed by the Environmental Fund and included in the National Integrated Wildfire Management Plant, is promoting energy reclamation from forestry waste in municipalities with a high fire risk. ●



THE ANSWERS EXIST

AFOCELCA

A force created by industry, in the service of the countryside

Kitted out in yellow, around 500 AFOCELCA fire-fighters stand by each summer, ready to protect Portugal's forests. Its priority is to defend the properties of The Navigator Company and Altri, but its operations reach far wider.

As soon as a fire alert is received at the AFOCELCA Operations Room, in Figueira da Foz, the Communications Operators have just two minutes to take a series of decisions. First they validate the occurrence. Then they assess whether it falls within their intervention area. If it does, depending on the size, location and prospects for evolution, they issue an order for the resources to be mobilised, all within this two-minute timeframe.
"The aim is to have teams at the site of the occurrence within 30 minutes of the alert", explains Sérgio Gomes, executive director of this forestry protection venture geared to fighting wildfires.. "Our resources, located throughout mainland Portugal, are geared to initial attack, in other words, to overcoming the fire right at the start, to avoid it moving into the properties we protect ."
Set up in 2002 as a joint venture by The Navigator Company and Altri, AFOCELCA has grown and developed its structure, whilst remaining true to its original mission: protecting the forest holding of the two companies, in collaboration with all the players involved in the Integrated Wildfire Management System.
AFOCELCA's full collaboration is the result of its inclusion in the Special Wildfire Fire-fighting System (DECIR). Recognised by the National Emergency and Civil Protection Authority (ANEPC), this organisation is represented at operational coordination centres, at sub-regional, regional and national level. A representative of AFOCELCA is present round the clock at all of ANPEC's 24 sub-regional command centres, seven days a week.

90% of fire-fighting action outside the protected properties

Although AFOCELCA's mission is to protect the estates of Navigator and Altri, it is mostly called out for fires outside these properties. Its area of action also includes a 2 km strip around the companies' properties, extended in some cases to 2.5 km.
"It is above all in these zones that we intervene", explained Sérgio Gomes. "If we look at data for the past five years, more than 90% of our operations took place off the companies' properties."
It is rare to an occurrence to start inside the properties of the group companies, reflecting the positive impact of responsible management as implemented in those areas. "The industry's properties are well tended and that decisively reduces the risk", explains Sérgio Gomes, adding that: "The woodlands we protect are often regarded as opportunities for fire-fighting. Because they are properly managed and cared for, they are areas

"If we look at the date for the past five years, AFOCELCA'S intervention on third party land amounts to 90% of total operations."

Sérgio Gomes, execcutive director of AFOCELCA



where fire-fighting operation can be carried out more effectively and safely".
And example of this was provided in August this year, in the fire in Pedrógão Grande: "In just five hours the fire was brought under control, thanks in part to the suppression operations in which we were involved in an area of properly managed woodlands, some of them belonging to the properties we defend", recalls Sérgio Gomes.

Active forest protection

Stopping small fires before they become large fires is the main focus of this fire-fighting force. When this is not possible, they endeavour to provide the best protection for forests in the circumstances, when DECIR's priority is to protect people and property. "The priority assigned to defending people and their property often means that the fire is not being fought. When the fire is not too large or in excess of our suppression capacity, the people commanding the operation sometimes take the attitude that AFOCELCA can take care of the forests, because they know we will be effective in a given area", explains Sérgio Gomes.
In terms of defending the properties managed by the two companies, "our objective of avoiding all and any damage is somewhat utopian, but that's what we aim at", he told us. In 2025, an especially difficult year, fires affected around three thousand hectares on the properties managed by Altri and Navigator (up to the closing date of this edition). An area corresponding to 1.3% of the total area managed by the two companies.
This was due in part to responsible management of woodlands. But there is another decisive factor: the companies' own forestry officers. "These are 70 professionals with in-depth knowledge of the land

"More than just a private forest, we defend our countryside"

"In the early 2000s, companies in the pulp and paper industry took inspiration from a model implemented in Chile. After contacts with organisations with private forest fire-fighting teams, with the idea of setting up something similar and with their precious help, the first steps were taken in Portugal. This was the origin of AFOCELCA. The venture now has twenty years' experience and an established reputation in Portugal.
AFOCELA differs from other organisations in that it is staffed mostly by professionals with real forestry expertise. These men and women work with us all year round, in forestry development during the winter months and in the fire-fighting support team in summer.
This brings a clear advantage and a twofold gain: we provide these staff with year-round work and so can rely on teams who are familiar with the landscape and the areas under AFOCELCA's protection.
This means the companies shoulder a responsibility which is also a public concern: defence of the countryside and woodlands, one of the country's great assets. Not least because AFOCELCA deploys resources not only on the properties of the two companies, but also beyond these administrative boundaries. With this, we a helping to protect forests, the forestry sector as a whole and rural communities." ●

Sérgio Maggiolli,
Forestry Protection coordinator,
The Navigator Company



and the access routes, who always travel with our teams at the start of operations. This support on the ground makes all the difference in fighting fires", stresses Sérgio Gomes.

Preparing for the critical months

AFOCELCA has its resources fully primed and operational during the fire season, from June to September, although this can start earlier or continue into October, depending on the meteorological conditions.
Outside this period, important preparatory work is carried out. Training is crucial: since 2022, AFOCELCA has been a training provider certified by the Directorate-General of Employment and Labour Relations (DGERT), and all members of its teams are currently trained by the company. The season starts up in March, with around 400 people receiving training: these range from those new to the job and others needing a refresher course (training is valid for three years). Others train to reach a higher level in the organisation, where they take on coordination roles.
Another of AFOCELCA' activities outside the critical months is to design and execute Controlled Burning Plans, with a view to prevention.
"This is essentially a way of managing fuel", explains Sérgio Gomes.
This practice is also an opportunity for training operatives: "An understanding of fire is essential. The more controlled burns we do the more experience we accumulate and the greater our ability to understand and overcome the behaviour of fire", he stressed.
In 2024, AFOCELCA launched a new prevention scheme: Strategic Fuel Management Mosaic Plans. The aim is to anticipate the points most vulnerable to the propagation of fire.
"On the basis of historical data, propagation simulators and information gathered from the companies' forestry officers, we identify the probable lines along which a fire would advance. These are the critical points, the place where it can get out of hand", explains Sérgio Gomes.
These locations will identified and built into Strategic Fuel Management Mosaics. The plan drawn up by the company indicates work to be done, either with machinery or with controlled burning, in order to minimise or eliminate the risk factors at those locations.
All this preparatory and preventive work, combined with the active and responsible management practised by Navigator and Altri, helps to diminish the fire risk and contributes to more effect suppression. ●

AFOCELCA in numbers

226 387,30 hectares
Area of properties under protection

Intervention Area
2 514 654 hectares
≈ 27% of mainland Portugal
(includes the properties of the two companies, plus a 2 km protection strip)

3 952
Alerts received in 2025
(up to early September)

319 occurrences
Interventions in 2025
(up to early September)

13%
on Navigator and Altri properties

87%
on third party properties

5 024 263€
Investment in 2025

450 to 500
Operatives

3
helicopters

3
helitack crews

33
heavy fire engines

13
light vehicles

8
bulldozers

1
water supply logistics vehicle

1
drone

"Together, we are stronger in protecting forests"

"Before AFOCELCA was set up in 2002, companies in the pulp and paper sector already fought fires on their forestry holdings. But it was each one for themselves. An understanding first took shape on sharing aerial resources, and it was a natural next step to join forces and set up a single outfit. Altri and Navigator often manage forests on adjoining properties. We are neighbours and share the same challenges. By working together, we can be more effective in protecting forests.
Over the years, there has been growing investment in AFOCELCA. It has expanded its human and material resources, and it has also evolved. More than just the growth in the protected area, this is due to the changing conditions we face, year after year. The complexity and scale of fires have demanded this. Today, it is not enough to go out into the field with good intentions and do what we used to do 30 years ago. You need intelligence, a strategy and new resources, including tech and artificial intelligence. We have to expand our capabilities, because the challenges are greater.
AFOCELCA has accordingly established itself as an organisation ready to achieve its mission, contributing to protection of forests as a whole." ●

João Marques, Wildfire Protection Officer, Altri Florestal

THE ANSWERS EXIST

Preventing with data, protecting with innovation

Technology is changing how Portugal prevents and tackles fires. Digital models of the territory, fed by LiDAR and satellite, simulators which test scenarios before fires occur, IoT sensors that trigger alerts, drones which project the flame front on the screen in real time. When these systems “talk” to each other, data stops being just numbers and turns into decisions in the field.

Portugal is becoming a living laboratory for tech solutions applied to preventing and fighting fires. Universities, research centres, companies and public authorities are working in networks to transform science into practical tools in the field. One of the leading players in these efforts is CoLAB ForestWISE, a Portuguese collaborative laboratory working on integrated forest and fire management.
Set up to convert research into workable applications, ForestWISE coordinates Portugal’s national Living Lab in the European FIRE-RES project, involving 34 partners and 13 countries and focused on the response to large fires. It is in Lousã and Vale do Sousa that these solutions are being tested and replicated with teams in the field.

Prevention requires knowledge of the land

Nationwide LiDAR (laser technology) coverage enables 3D mapping of the forest, including undergrowth - the fine fuel that accelerates fire propagation. This is joined by satellite imagery, weather stations, mobile inventories and historical records of occurrence; all these data feed propagation simulators which run scenarios with different variables: wind, humidity and fuel profiles. The result is not theoretical, but rather maps of hazards and priorities which serve as a guide for planning management strips, land use mosaics, protection of infrastructures and the sequence of forestry operations.
Data quality and updating are crucial. The more accurate, full and up to date it is, the more reliable the simulations and the allocation of resources ForestWISE has brought science within the reach of operators on the ground, providing accessible tools which private landowners and local bodies can also use and feed with useful information.
In connection with the cross-border RATEOSPC project (Interregional Spain-Portugal), the University of Aveiro is using the Internet of things



B.Botequim



Hosepipe with an attachment that creates a water “shield” to protect fire-fighters.

(IoT) to measure temperature, humidity and win, in real time, and generating predictive alerts. Networks of low cost sensors complement satellite observation and add to the effectiveness of the simulators.
At the same time, there is a net political impetus for new technology: in September the Portuguese Parliament approved increased used of prevention drones, citing practical results in Galicia and Sardinia, and validating automatic early detection and artificial intelligence as part of the response.
In essence, this entails transforming a wide constellation of data (LiDAR, satellites, sensors, wearables and drones) into a shared decision-making framework which can reducing response times, exposure to risk and the burnt area, as well as protecting people and critical assets.

Sensors, satellites, drones and artificial intelligence are changing how we prevent and tackle fires.

“The future of the forest lies in prevention”, stresses Ana Sá, Risk Manager at ForestWISE. “Nothing is gained from pointing the finger at species - eucalyptus or pine, instead, where forests are managed, the risk is less”, she concludes.
In short: better measurements, for better forecasting and a better response. When data, models and operations work with the same map, the forest gains time and the country gains resilience.

The best fire-fighting is fast, effective and safe

At the national Living Lab for the FIRE-RES project (Lousã and Vale do Sousa), wearable sensors are being tested on firemen and vehicles, to assess the location, physical effort and exposure to heat. This data feeds the fireline estimation, marking

B.Botequim



B.Botequim



Wearable sensors for fire-fighters and vehicles measuring location, effort and exposure to heat.

safe and high-risk zones on the map and helping to make decisions on manoeuvres and withdrawals. “The safety of operatives on information that tells them, in good time, when to pull back or change strategy”, explains Brigite Botequim, senior researcher at Colab ForestWISE.
There is also aerial surveillance in fire fighting. Mejora Technologies, a company based in the Netherlands and specialising in data- and AI-driven wildfire prevention and mitigation, combines drones and algorithms to generate maps of the flame front in real time, with the evolution of the fire reaching the command post practically in synch in with its movements on the ground.
Another company, TechnoSylva specialises in wildfire management software which integrates meteorological, topographical and operation data in order to model and predict the behaviour of fire in real time and support tactical decision-making.

From protecting infrastructure to equipment in the field

Protecting critical infrastructures demands anticipation: the software being developed by REN, the company managing Portugal’s national grid, in the project “Increasing Resilience of Assets Facing Risk” (Portugal), presented in the FIRE-RES Open Innovation campaign, will be free to use and has been built using the SimInfire simulator (with support from ADAI - an association linked to the University of Coimbra and a leader in research into fire behaviour). Users can pre-set the assets to be safeguarded: gas pipelines, homes, campsites and all the structures envisaged in the protocol, sending out alerts whenever the simulations point

When data, models and operations work from the same map, the forest gains time and the country gains resilience.

to risk in those areas.
For its part, in order to keep the models true to the terrain and to follow the dynamic of the fuel in shrubs and trees, the FIRE-RES Geo-catch mobile app creates a fast track: with geo-referenced photographs taken in the field and artificial intelligence able to identify fuel models and to update the layers used in the simulators.
Innovation is also changing equipment, and lighter and more heat resistant PPE (Personal Protective Equipment) is currently under study. Another solution in development, in this case by operatives working for the Galician authorities, is a hosepipe able to generate a water “shield”, designed to protect teams in the field in high temperature settings.
And autonomous standalone devices are also emerging, such as that from the Portuguese company Hephaesnus, which is marketing Sallus Guard: a stationery device that detects flames at a distance of up to 10 metres and releases retardant to protect a surrounding area of up to 30 m^2.
When know-how is transformed into practical tools and technology serves decision-making in the field, operators gain time and the risk is reduced.
But in order for all this to work,. interoperability is the key: the ability of different systems, technologies and organisations (from the National Civil Protection Authority to the ICNF, and from the Directorate-General for Transport to local fire brigades) to work together, with shared information and coordinated decisions. Only then can innovation effectively play its role in preventing and fighting forest fires. ●

Living and working with fire

By António Salgueiro, Forestry engineer accredited in controlled burning

Fire has always been part of Mediterranean ecosystems. Misused, it can be destructive, but used in a controlled way it turns into an essential tool for reducing the fire risk, for managing and protecting forests and the countryside (and for learning).

In regions with a Mediterranean climate, such as mainland Portugal, the driest season coincides with the hottest time of year. This feature of the climate is joined by the Atlantic influence, with moderate to high rainfall outside summer, in the north and centre of the country. In very broad terms, these two factors result in relatively high primary production of vegetation, which suffers a severe water deficit during the summer, favouring the propagation of fire. This situation has led to the development and predominance of species which are well adapted to fire, shrubs in particular (but not only), with a high capacity for vegetative regeneration (shoots from stumps or roots), retention of dead matter in the aerial part (gorse and carqueja), a large quantity of inflammable volatile components, thick bark, highly protected buds (as in pines and cork oaks) or late developing cones (pine trees).



In all regions and climates with a pronounced dry season, mankind has known for tens of thousands of years how to use fire to manage ecosystems, in particular for pasture and wildlife, so as to secure the best conditions for their livestock. Fire has also been used to promote the attractiveness, palatability and digestibility of vegetation, improving the conditions for herbivores and promoting their development.
The rational use of fire at the most suitable times of year made it possible to improve yields and biodiversity and, at the same time, to "construct" (or design) a mosaic with vegetation of different ages and different characteristics, reducing the possibilities of large summer fires, which would force them to travel large distances to hunt or graze their flocks.

Controlled burning in pine forests

In the mid-70s, a number of forestry officers identified the need and an opportunity for increased and improved understanding of how our ecosystems work and their close relationship - constructive or destructive - with fire (which had by then started to be regarded as an element completely alien to forestry objectives, causing its elimination to become an objective), using a rather more technical component of research and application in situations very different from traditional uses.
This was how controlled burning came to be known and applied in Portugal, thanks to the teachings of Edwin V. Komarek and the determination and skill of Eng. Moreira da Silva in finding and developing solutions for reducing the fire risk in the country's forests of maritime pine. His pioneering work attracted followers and inspired a large body of research, trials, learning experiences, regulations and technical training, thanks to his modesty and belief that the best way to learn to deal with fire is to work and learn to live with it.
My personal experience with thousands of hectares means that I have no doubt that, over that period, the best prescription - meteorological conditions and fire behaviour indexes - was developed for treating stands of maritime pine with controlled burning, thanks to the great man's work, and to the subsequent efforts of Paulo Fernandes, Francisco Rego, Hermínio Botelho, Carlos Loureiro and others.
It is a shame that it is not applied to the extent needed, largely due to the decision, or indecision, of those in a position to decide, for no good reason, despite the worrying pace at which the area occupied by the species in shrinking, although it is highly resilient to fire.

Controlled burning in eucalyptus forests

Let us now focus on the use of controlled burning in stands of eucalyptus. This species is very well adapted to fire and accounts for a large proportion of Portuguese woodlands, with specific forestry practices, often conducted professionally, but subject to frequent damage caused by fires. It might therefore be expected that controlled burning, carefully applied, would be a normal approach to reducing the fire risk.
But when this was envisaged and the



THE ANSWERS EXIST

It is regrettable that the highest levels of prescribed burning in forest stands date back to the late 2000s.

first demonstrations carried out, two issues arose that might undermine the industrial use of this species for producing paper pulp. 1) epicormic shoots from the trunk, which might be prompted by controlled burning; 2) the potential carbonisation of small branches on the trunk, which might be maintained in the living bark.
In view of these possibilities and the potential advantages of using controlled burning as a prevention tool, it was clear that more needed to be known about the use of this technique in these stands, and in particular that these two issues needed to be clarified. This led to an R&D research project entitled FIREglobulus, through a partnership between the company GiFF (Gestão Integrada de Fogos Florestais, where I was a manager at the time) and UTAD (University of Trás-os-Montes and the Upper Douro), led by Prof. Paulo Fernandes, in order to test and investigate the use of controlled burning in eucalyptus forests in order to reduce the fire risks. The field work was carried out on properties belonging to The Navigator Company. This project resulted in publication of a guide to controlled burning in eucalyptus plantations.
The best solution for fuel management in the undergrowth of stands of this species is very probably based on combining harrowing treatments when the trees are younger, followed by treatment with controlled fire as the trees enter adulthood (~7 years), in any rotation.

Controlled burning in operating waste from eucalyptus forests
The accumulation of operating waste between rotations of eucalyptus plantations creates the most critical situations in terms of the fire risks for these stands, because of the great fuel load of dead matter left on the soil, which can be in excess of 100 tons of dry matter/ha in total, with approximately 20 tons ms/ha of fine fuel.
On the basis of information gathered in a number of controlled burns carried out by GiFF in these circumstances for Navigator (then the Portucel Soporcel Group), fine materials were reduced by 91% (from around 20 to ~2 ton ms/ha, meaning that a situation that exceeded the fire suppression capacity, even in normal situations, could be transformed into situations easily controlled with manual tools in the same meteorological conditions). These trials also enabled us to conclude that controlled burning does not interfere in the mortality of stumps or in their development, and is accordingly an extremely effective technique for managing in these situations.
Another more recent study, based on far more thorough research, soon to be published, by Sofia Corticeiro and others, arrived at similar findings.
Even in situations where biomass is collected and reclaimed, it will be worth considering controlled burning (especially in seasons with high levels of productivity), insofar as the biomass removed consists essentially of the larger materials, leaving most of the fine fuel on the ground.

Why controlled burning makes a difference
Irrespective of whether further research can be conducted into the use of controlled burning, it is clear that no other fuel management technique in forest stands has been researched to the extent as the use of controlled burning in Portugal.
Like any management technique, it has its limitations (which are above all technical and meteorological) and should not be regarded as a standalone solution. Instead it should be used when the prescription and fuel conditions are right, and offers substantial advantages:

i) It eliminates practically all fine fuels (1 hour fuels), the principal component in fire propagation;
ii) It is not limited by gradients;
iii) It treats fuel in and between lines of trees;
iv) It can be applied with any soil preparation technique;
v) It does not affect the trees' root system;
vi) It speeds up the nutrient cycle;
vii) Consumption of fossil fuels is very low;
viii) Large areas can be treated in relatively little time;
ix) It poses very few risks to operators (except for the treatment of scrubland and operating waste);
x) It offers excellent training and learning opportunities for those involved in fire prevention and suppression;
xi) It promotes team work and team spirit, complementarity and know-how, in connection with fire suppression, in preventive treatment locations (opportunities).



The future
So what's stopping us from using controlled burning more widely? That's a difficult question, because in the face of the huge damage caused time and time again by fires in unmanaged (but also managed) woodlands, and all the evidence showing how useful controlled burning would be for reducing the fire risk, you would expect the technique to be applied more often! Might it be out of misgivings, the fear of being blamed, or of losing a few individual trees in forest stands with thousands per hectare, when controlled burning is used? Or perhaps the lack of real knowledge about the behaviour of fire, in a country which is always burning in the worst meteorological conditions, given that the only specialist training at higher education level consisted, until very recently, of training for accreditation of controlled burning officers.
It is sobering to note that use of this technique to treat the undergrowth in forest stands peaked in the now distant late 2000s, with initiatives by the Controlled Burning Specialists Group (GeFoCo), making it possible to treat thousands of hectares with this techniques (in many cases successfully suppressing fires, passively and actively, in the years that followed) and to identify and promote a group of professionals who, with complementary specialised training in fire, worked with the Controlled Burning Specialists Group, from 2006 to 2010, devoting themselves specifically to strategic planning, controlled burning and help in analysis, organisation and suppression of major fires.
Let us hope this situation will change, and that the invitation to write this article shows a new willingness to think again! We cannot choose to let fires be an inevitability in our climate, when, as we all know (or should know) this tendency is only going to get worse, as regards the conditions for fire and their intensity, if we fail to adopt the most efficient measures. Rational use of fire will be one of the best ways forward, if we choose to harness the potential of good fire to the detriment of bad fire. ●

Why is the weather in control of fires in Portugal?

By Carlos da Camara, Researcher at Instituto Dom Luiz, Faculty of Science, University of Lisbon



Large-scale fires are not selective in terms of the type of plant cover, but instead reflect the way the land is managed.

Major fires in Portugal are always preceded by warnings of extreme meteorological conditions. A practical way of quantifying the effects of the meteorological parameters on fire behaviour is to use the "three thirties" rule: the conditions are right for large fires when air temperatures are over 30 degrees Celsius, atmospheric humidity is below 30 per cent and wind speeds above 30 kilometres an hour. There is also the "four thirties" rule, which adds more than thirty days without rain. The fire hazard indicators, like those making up the Canadian System, which is used for operational purposes in Portugal, are also based on temperature and ground-level atmospheric humidity, wind speed at 10 metres and accumulated rainfall in the past 24 hours. The models for forecasting the severity of the fire season in Portugal, which provide useful information as from the start of June, are also based on calculation of the cumulative effects of meteorological conditions on the abundance of information of biomass and the dryness of fine fuels.

The success of fire hazard forecasting models should not camouflage the fact that the weather conditions which are favourable to the development and propagation of fire are a necessary condition for the occurrence of a major event, but not a sufficient condition. Because whilst the appropriate meteorological conditions assure the supply of oxygen for combustion to take place, it is also necessary to have enough fine fuel and biomass to feed the fire and an ignition to start off the reaction.

Whilst the general public will normally have a clear understanding of how the weather affects the fire risk, the same is not true of the role of the plant cover and ignitions, where people's ideas are often derived from urban myths or conspiracy theories unsupported by the actual facts. We can point to the widely accepted belief that the severity of fires is due to eucalyptus and maritime pine being peculiarly prone to burning, and to the criminal acts of marauding arsonists serving a plethora of different economic interests. However, the facts tell a different story, clearly showing that large-scale fires are not selective in terms of the type of plant cover, but instead reflect the way the land is managed, that scrubland accounts for the largest share of the burnt area in the past forty years, that half of all ignitions are the result of carelessness, mostly in farming and grazing activities, one fifth are due to reignitions and only 28 per cent are intentional, due in the most part to quarrels between neighbours, heavy drinking and mental disorders.

The problem of the severity of fires in Portugal should therefore be examined through an integrated perspective that takes account of the role played by the weather, land use planning and human activities. It is from this combined perspective that we should look at the crucial role of meteorological conditions in the development of major fires.

To use an analogy, we might compare the intensity of fire to the brightness of a light bulb in an electrical circuit comprising three wires connected in a series where the less land use planning there is, the less human behaviour is responsible and the more severe the meteorological conditions, the less resistance there is. The lack of land use planning and the still large number of ignitions in Portugal means that two of the wires always present a low level of resistance, meaning that the brightness of the bulb/intensity of the fire depends in practice on the value of the resistance determined by the weather.

The idea that large-scale fires can be resolved with more fire-fighting resources and manpower, and not through organised brigades of professional forest firemen who ensure the countryside is properly organised and who monitor ignitions in the areas for which they are responsible, will enable meteorological conditions to remain in control, playing a role which will be even more decisive in the years ahead insofar that climate change, due to anthropogenic forcing, will contribute to an increase in the frequency, intensity and extent of extreme phenomena, in particular droughts and heat waves, whose contributory effects is crucial in the occurrence of fires that are impossible to suppress. ●



Protecting forests is a question of economics

By Duarte Cordeiro and Tiago Centeno, Partners at Shiftify, a consultancy firm

The ownership of Portugal's rural properties and woodlands is organised along very specific lines which means that the country needs to reflect and reach a consensus in order to transform the countryside into a factor of environmental, social and economic resilience, able to attract investment and create development and job opportunities, especially in interior regions. To achieve this, it is essential to arrive at lasting agreements on three core issues:

The first strategic issue is reform of rural land ownership. According to data from ICNF and the Working Group for Rural Land Ownership (GTPR), set up in 2021, Portugal has more than 8 million hectares of rural properties (woodland, scrubland and pasture, farmland and other uses), divided between 11.5 million properties, of which some 3.4 million belong to estates awaiting division between the heirs, representing 30% of all land. This fragmentation leads to very small average areas: 9.9 hectares in the Alentejo, 1.3 hectares in the north, 0.6 hectares in central Portugal and 2.3 hectares in the Algarve. Without joint management models or increased concentration of ownership, we will never manage to be competitive. Land ownership reform is the starting point for any long term strategy for the forestry sector, for fire prevention, for achieving carbon sink targets and for policies for repopulating the interior. Only through increased economic value and the better returns achieved by scaling up production will we be able to attract investment, encourage people to settle, create jobs, ensure land is cleared of fuel and reduce the risks.

The second core issue is alignment between the voluntary carbon markets and nature restoration, on the one hand, and farming and the most important forestry sectors, on the other. In 2024, forestry products accounted for 8% of all Portuguese exports, with a value of approximately 7.9 billion euros, up 180 million from 2023, whilst imports dropped by 60 million, ensuring a surplus in excess of 3 billion. However, research by Boston Consulting Group for Fundação BPI La Caixa warned that, if nothing is changed up to 2050, the sector could lose between 4 and 5 billion euros due to the shortage of raw material, its inability to compete and natural risks. In order to counter this scenario, we have to add new forms of income, such as carbon or biodiversity credits, conciliating them with forestry and regenerative farming ventures. For example, these schemes should support montado (cork oak woodlands) and also combined eucalyptus/native forest ventures. It is also important to avoid complex or moralistic regulations that leave us out in the cold. We should keep up with international regulations and developments in larger countries, such as Spain, on pain of missing yet another opportunity.

The third core issue is to support the development of the main forestry sectors, establishing long-term agreements which guarantee predictability attract investment and ensure that larger areas come under management. In the case of montado, support is needed for denser tree cover in order to increase the raw material available and to validate the research into carbon credits. In pulp and paper, it should be made feasible to substitute less productive areas with new areas of scrubland or uncultivated land, provided the less productive areas are converted into landscape transformation projects, for which the companies are held responsible. It is likewise fundamental to support the research already under way into carbon credits and new uses in lasting products. As for pine woods, it is essential to encourage incorporation of more recycled wood in the production process of the furniture industry and to continue to invest in research into resin and its multiple uses.

Portugal has made significant progress in preventing forest fires, with more investment in planning, in fuel management strips, and in technical and human resources for the ICNF and the forestry land registry. But without economics, the forest will still not be viewed as an asset, and instead regarded as a problem, especially in years with major fires. The best way to protect the forest and bring life to the interior is to boost the economy.

We have no forestry policy in Portugal

By Francisco Gomes da Silva, Professor at School of Agriculture, University of Lisbon, and managing partner of Agro.Ges

Forestry and agriculture, broadly defined, have always together occupied the most significant portion of Portugal's territory. In other words, over a long period of time, farmers and forestry producers, because they were often one and the same person, knew how to manage their resources (including the land at their disposal) using an economic logic that made their ventures viable. This viability derived from the competitive nature of their production systems (because their products were valued in the markets) or, alternatively or on a complementary basis, in cases where commercial competitiveness was lacking, that viability was achieved through a series of economic and financial incentives provided by public policies. And for many years, until the nineteen seventies or eighties, this balance enabled, among other things, fuel (and fire) management supported by a viable economic model.

What changed? As we all know, first of all, the production systems changed, both in farming and in forestry. This change was due to a very significant alteration in social habits and practices (which ideally would have brought changes in technologies and the ownership structure, but did not) and in the markets, which condemned to "unviability" a series of production systems which had occupied vast areas of the countryside, causing a sharp reduction in the intensity of management of these areas, as an economically rational option. This was a situation that easily segued into complete abandonment, as happened in significant parts of the country.

And what hardly changed at all? Public policies, in particular those centred on forests, which should have moved towards influencing a rethink of production systems, in order to promote healthy viability. Or rather: agricultural policy actually changed significantly (with Portugal's adoption of the CAP as from 1986 and with only one very marginal component relating to forests), but that change had the undesired side effect of further encouraging the "abandonment" of areas of more marginal interest for farming and forestry.

In other words: public policies failed to find a way of at least compensating the imbalance caused by changing habits, social behaviours and markets. The consequences are plain to see: accumulation of large quantities of biomass on the ground and a sharp reduction in the use of fire as a technological tool essential, for example, for pastoralism. At the same time, progressively more acute climatic conditions have brought the scenario of fiercer fires with which we are all familiar.

So it is fairly simple to explain reasons behind the more extreme fires we now experience in certain years.

The difficult part, apparently, is to find a way to make the countryside, largely given over to woodlands, more resilient, in other words, to ensure that underlying (i.e. not ephemeral) conditions are established which can reduce the fire hazard and the respective level of danger in those regions.

In my view, as regards forests, this difficulty derives from the fact that successive governments have practically abdicated responsibility for designing and implementing (let alone assessing) any real forestry policy. Instead, the forest has been the pretext for public policies dealing with issues such as carbon sequestration, biodiversity, fires or soil protection, among others, which arise essentially as constraints on the management and operation of forests. In other words, forests are increasingly hemmed in by a host of policies, almost all originating in Brussels, which drastically curtail the freedom that a national government can exercise in delineating forestry policies.

Forests are increasingly hemmed in by a host of policies, almost all originating in Brussels, which drastically curtail the freedom enjoyed by national governments.



A good example of this are the policies that, most significantly since 2017, have focused on fires. Objectively, some of the measures that have been approved and implemented to tackle fires result in clear limitations on the development of forest-based economic activities. The prohibition of any work in the countryside on days with a high fire risk, the imposition of "clearance" costs on properties unable to generate the income to pay them, or the design of fuel management strips which often swallow up entire properties, are a good example of this. The obsession with carbon sequestration, making forests responsible for offsetting anthropogenic emissions, imposing clear restrictions on the intensity of forest management, is another example.

Suffice it to consult the Forestry Policy Basic Law, unanimously approved by the Portuguese parliament in August 1996 (some 30 years ago) to realise how far we are from putting into practice the noble principles it enunciates, by creating real forestry policies. And if we did this, coordinating them carefully with farming policies, we would certainly be closer to achieving the structural conditions that would help us prevent major fires. ●

Agriculture and forestry united in fire prevention

By Luís Mira, Secretary-General of the Confederation of Portuguese Farmers (CAP)



A forest that generates no income for its owner is bound to be abandoned.

Wildfire prevention is one of the main challenges facing the country, Europe as a whole, and in particular the farming and forestry community, as was demonstrated in the summer of 2025.

As a result of several awareness raising campaigns, we have seen a reduction in the number of ignitions, in particular when compared with the period 2001-2017, above all due to changes in behaviour associated with the use of fire. However, fire currently presents us with a paradox, namely that because of the lack of active management of vegetation we have accumulated fuel that feeds faster, fiercer and more destructive fires.

On the other hand, since the tragic fires of 2017, out technical and scientific understanding of prevention and fire-fighting has grown consistently. We now need to take the next step, transferring this know-how to the different actors, and raising even further the professional standards in fire-fighting.

Contrary to what public opinion often suggests, it is not forest stands of eucalyptus which account for the largest share of the burnt area. According to figures published in August this year by the Higher Institute of Agronomy, concerning 72 fires with an area of over 100 ha, eucalyptus stands accounted for less than 20% of the burnt area, lower than the proportion of Portuguese woodlands occupied by this species (according to the latest National Forest Inventory, eucalyptus stands represent 26% of the forested area).

The frequency and intensity of wildfires are due to multiple factors, including abandonment and the consequent lack of active management of the countryside.

Preventing fires therefore requires an integrated vision of countryside management and so there is an urgent need for more rational (forest) management, breaking up large tracts of fuel-laden forests so that woodlands alternate with other uses.

Active agriculture functions as a natural barrier against fire propagation. Cultivated fields, pasture land and diversity of agricultural crops break up the forest cover, reducing the fuel load. Extensive livestock farming, for instance,. contributes effectively to management of scrubland, whilst irrigated crops create damp containment zones. So support for farmers is not just a way of injecting life into the local economy, but also an investment in the resilience of the countryside.

Forestry has to be viewed as an economic activity or else no one will be interested in investing in these areas, with consequences which are not just economic, but also environmental and social. A forest that generates no income for its owner is bound to be abandoned!

The multiple programmes run by The Navigator Company to support forestry producers, such as the Premium programme, providing advice, or Tec4Forest, which transfers know-how and shares information, contribute to better forest management, higher yields and consequently income for producers.

However, above all in the context of climate change, when more and fiercer fires are expected, this private sector endeavour is commendable, but it is not enough for us to have a country better prepared and more resilient to wildfires. Society as a whole has to engage with the issue, in particular in the public sector. In effect, in order for prevention to be effective, there has to be partnership between farmers, forestry operators., local authorities, the State, universities and the general public.

We also need to create economies of scale, with schemes for sharing technical and material resources for countryside management and surveillance, and organisations of farmers and forestry producers have a key role to play here.

Fire prevention cannot be understood merely as fire-fighting, but instead as integrated management of the countryside. By working together, farming, forestry and land use planning create a more resilient countryside, able to reduce the intensity of fires, protecting people, property and ecosystems. Bringing life, productivity and profitability to the countryside is the best strategy for preventing wildfires.

THE ANSWERS EXIST

Preventing burns less: how cork protects woodlands

By António Amorim, Chairman of Corticeira Amorim

In a country where forest fires are a recurrent threat, prevention is more than a duty, it's an urgent need. This awareness has taken root in the cork sector, because montado - cork oak woodlands - is not just a unique ecosystem, but also the foundation of one of the world's most sustainable industries, in which Portugal is the world leader. To preserve it is to protect and ecological, social and economic asset.

Fire prevention starts with responsible forest management. The cork sector has adopted a set of good forestry practices which significantly reduce the fire propagation risk. These practices include:

- Clearing undergrowth, by removing scrub and dry vegetation that feed fires;
- Controlled thinning, avoiding the woodlands growing too dense, which hinders access and facilitates propagation of fire;
- Creating and maintenance of fire breaks, creating natural barriers to the progress of fires;
- Controlled grazing of livestock, which helps to keep scrub under control, reducing the fuel available;
- Continuous monitoring and training of forest landowners and workers, promoting a culture of active prevention.

These practices, combined with sustainable and certified fore plans, are designed to mitigate the fire risk and to promote forestry yields and biodiversity, conserve soils and improve the resilience of the ecosystem.

The cork oak, a tree native to the Iberian Peninsula, is perfectly adapted to the Mediterranean climate. It is important for much more than producing cork. It is a key species in the balance of the ecosystem, helping to regulate the water cycle, sequester carbon, conserve biodiversity and prevent desertification.

In addition, it is a tree protected under Portuguese law precisely because of its ecological, economic and cultural value. The montado, which is woodlands where the cork oak predominates, is one of the most biodiversity-rich ecosystems in Europe, home to species such as the Iberian lynx, the Imperial eagle and countless endemic plants.

One of the most remarkable characteristics of the cork oak is its natural resistance to fire. The cork that surrounds it functions as a natural thermal insulator, protecting the trunk from the direct action of the flames. After a fire, although many species succumb, the cork oak has an extraordinary capacity for regeneration. This facts means that cork oak woodlands are extremely resistant and resilient to the propagation of fire. This resistance should not be an excuse for negligence. Prevention continues to be essential in order to avoid irreparable losses, especially in situations of very fierce and/or recurrent fires.

Promotion of mixed stands with higher density, including cork oaks as a species able to prevent and combat the impact of fires, is a crucial and necessary element to be included in public forestry policies.

The cork sector has shown that it is possible to combine economic production with nature conservation. A well-managed forest is, by definition, a safer forest. Investment in good forestry practices and technical know-how. and engagement with local communities have been fundamental in keeping the montado alive and productive.

To protect the cork oak is to protect a way of life, a circular economy and an ecosystem of great value. And because "prevention burns less", a commitment to responsible forestry management is increasingly the road to a sustainable future.

THE ANSWERS EXIST



Coordination in fire-fighting and professional development of Forest Firemen

By António Nunes, President of the League of Portuguese Firefighters

When we talk about wildfires, we step onto ground where responsibilities and powers are divided between a host of ministries, authorities and institutions, both public and private. This situation makes it difficult to have a coherent strategy. I will here focus on fire-fighting and, in particular on the framework established by National Operational Directive no. 2 (DON 2), which regulates how resources are coordinated through the Special Wildfire Fire-fighting System (DECIR).

The main purpose of DECIR is to establish primary responsibilities and to coordinate the multiple actors with shared responsibilities in rural and periurban areas, acting so as to ensure the country is managed and efficient techniques and tactics are employed in fighting or suppressing fires, in coordination with any connected or resulting risks. It also provides an operational framework for the responsibilities of the different organisations in the Integrated Wildfire Management System (SGIFR), in keeping with the chain of processes established in the National Integrated Wildfire Management Plan (PNGIFR) and related to fighting wildfires, at the pre-suppression, suppression and rescue stages.

It involves fire brigades, special and security forces, ICNF (Institute of Nature Conservation and Forests) resources and officers, AFOCELCA resources, the armed forces, municipal units and other teams with technical capabilities. This is a vast ecosystem, all with legitimate missions, but which often overlap.

In practice, when these entities converge on the same theatre of operations,. the whole coordination process becomes highly complex and extremely challenging. The fact that teams with similar or even competing functions are working simultaneously creates complexity, duplicates efforts and undermines effectiveness. It is no surprise that, year after year, coordination continues to be highlighted as one of the main areas for improvement in the wildfire suppression system.

More organisations on the scene does not in itself result in more effective action. Without clear demarcation of responsibilities and without processes that foster rapid decision-making, this multitude of actors can result in red tape, operational noise and wasted time - precisely what we can not accept in a fire-fighting situation where every minute counts.

It is here that professional development and standardised responsibilities become important. Because of their technical training and experience and their familiarity with the territory, forest firemen can play a decisive role. This role requires a clear operational identity, with specialist missions, complementing those of other actors. In this way, they are not just a valuable component in DECIR, but also crucial as a pillar in prevention.

A number of significant constraints can still be identified in the field of prevention, in particular in fuel management and implementation of primary and secondary networks, where, among many other function, the forest fire brigades have a crucial role, serving as a force with complementary functions in wildfire suppression.

In conclusion, just as important, if not more so, as professional development of forest fire brigades, which play an essential leading role, especially in prevention, but also in fire-fighting, is ensuring the functions and tasks of different organisations complement each other, rather than competing with one another. In other words, specialist teams should be set up which can complement fire suppression action, making fire-fighting operations and their coordination more efficient. As examples of specialist teams than complement each other, we can mention: analysis and use of fire, bulldozers, helicopter transport, aftermath management, coordination and command, logistical and operational support, reconnaissance and assessment of the situation, UAS, anticipation, communication and others.

In other words, more than “having more resources”, we need to coordinate better the resources that already exist. Professional development for forest fire brigades and clearer missions and interfaces between organisations are the way to more effective coordination, safer operations and more consistent results in the field. ●



Because of their technical training and experience and their familiarity with the territory, forest firemen can play a decisive role.



Wildfires: accepting reality

By Miguel Freitas, Professor at the University of the Algarve

In the summer heat the same scenario plays out over and over: large fires, panicked villagers, families saving what they can, exhausted fire fighters, houses destroyed, landscapes reduced to ash. Announcements of generous funding, but it seems very little trickles down to countryside. The solutions rarely touch on what is really needed: transformation of the landscape, a revived rural economy and guarantees of a sustainable future for country dwellers. Woodlands are increasingly degraded, losing value and resilience. Public policies appear condemned to failure: plans are presented, strategies are drawn up, reforms are announced, but in practice little changes. Nothing is actually implemented, funding is late in arriving, intermittent and misdirected. It seems clear that the country remains far from arriving at an effective response to the structural problem of wildfires.

In the field, communities hold out, reinvent themselves, search for solutions. First of all, we need to understand the factors that shape the decisions of forest landowners. Then we need to value the people who live there, who know the land, who want to do things differently. Yes, there are absentee landowners and abandoned land. But there is also knowledge, effort, organisation and a desire for change. Intelligent public policies are needed to support, guide and mobilise these actors.

The script for wildfires has been written. We need to step up prevention and have better coordinated, integrated and specialised fire-fighting forces. The Integrated Wildfire Management System is being implemented as a participative and adaptive model, which allows for dialogue and joint learning, and for flexible and locally based application. There has to be planning with realistic estimates and objective sources of funding.

The protection networks - with fuel management strips and mosaics - are already on the ground. Compensation is being provided to landowners affected by the Primary Network (the forest protection “motorways”) although this has been achieved in only 30% of cases. It is time to reassess this model, find methods that enable a more accurate analysis of these networks and can establish priorities. Multiple actors are also involved in the Secondary Network. Above all, it is necessary to promote an integrated approach shared by protection networks and woodlands under active management.

A country divided into smallholdings is weighed down by the problems of over-fragmentation, land inherited by multiple heirs and still awaiting division, land with no known owner and the fact that a significant proportion of land is not registered. These difficulties are joined by the lack of clear and workable legal instruments to conciliate the law on land ownership with the law on land management. It is politically viable to move ahead with reform of land ownership.

There is also consensus on another question: we need more and better forest management, especially in areas divided into smallholdings. We have to exploit the potential of combined management and bring new life to Forestry Intervention Zones. We need a simple and robust programme for action at the landscape scale. To consolidate the Integrated Landscape Management Areas, the Common Land Groupings and the Active Forest programme. We need to look at experiments that work, like the “Clear and Fertilise” scheme, and support wider implementation. In short, we need to strengthen local organisations, build stronger ties between forest producers and industry and guarantee stable funding. In other words, invest in social innovation.

It is important to assign greater value to the forest, to conciliate intensive production systems with an ecosystem perspective, to structure new natural capital markets which encourage a bank of carbon credits and nature credits, which can remunerate activities essential for countering the tendency for abandonment of crucial areas for nature conservation, badly affected by fire, to create continuous management models and multiple uses which offer returns in shorter periods in long-cycle forestry.

Science and technological innovation are part of the answer. A new way of thinking about forests, combining productivity and resilience, and the use of digital technologies, robotics, artificial intelligence and modern machinery - all this can make the sector more attractive, profitable and safer. In fire-fighting too, the digital transformation and artificial intelligence are revolutionising forecasts and operational analysis.

More than ideas which are good on paper, the country needs firms and coherent public policies, which translate into action. Only then will it be possible to transform the countryside and build a forest landscape that can withstand fire - and the risk of being forgotten.

THREE QUESTIONS FOR...

Victor Louro, Forestry Engineer

"Policies get changed... as often as shirts get washed!"

What do you think most urgently needs to change in countryside management in order to reduce the fire risk?
Before we get on to the landscape, I think it is essential to follow the plan (National Integrated Wildfire Management Plan) which has been approved! This is because it was discussed and established with the participation of a host of experts, researchers and people involved in the field, in particular producers' organisations, and then approved by the proper authorities.
One of the failings systematically - and fairly - attributed to "forestry policies" is the lack of continuity: policies get changed... as often as shirts get washed! And this is not compatible with the long term nature of forestry (even planted forests), as well as damaging the trust of the actors involved. The other great failing, common to many industries and sectors, is that the policies are not thought through: they are changed... on the basis of inspiration or convictions. This is unacceptable in the case of wildfires, because the country actually has a well put together plan, provides for - and carried out - periodic assessments. Without prejudice to the contents of the plan (which I defend), I am upset by the obsession with wanting to do everything by the book, everywhere and at the same time, because the physical conditions, and above all the social conditions, vary widely. It is my conviction, from what I have seen, that what works best is that which is embraced by the so-called addressees (I dislike the term, because they should be involved in policy making).



Understanding this, and without prejudice to the efforts to be made by State institutions in relation, for instance, to the positioning of fuel management strips, it seems to me essential to win over local people to the small things first - the things immediately within reach and which they talk and worry about; and then to gradually move on to the more complex things. It is clear that in many situations it is possible to do both simultaneously: for example, the positioning of fire breaks cleared of vegetation around villages is perfectly compatible with Integrated Landscape Management Initiatives. As these initiatives gain support, thanks to their success, they will naturally be applied more widely.

What is stopping Portugal from consistently applying the technical and scientific expertise it possesses?
We have the scientific and technical expertise. But we have trouble in applying it....
I think one of the bottlenecks is in the design of the actual institutions which ought to integrate and apply new ideas. But the main factor lies in the lack of political authority. No, I'm not defending a dictatorship! Political authority is earned, not imposed: through people's participation, by people signing up to ideas (even when they customise the original measures), and respect for those measures, first and foremost from political leaders. But there is no lack of inertia and resistance. And politics cannot be a matter of just following the prevailing wind.

Where can forest-based industries have the most positive impact?
Forest-based industries should be directly and indirectly involved in developing measures that help to achieve the policy objectives. They can establish partnerships which bring technical improvements and price benefits, for example. They should go beyond their own specific objectives (the immediate interests of supply and profit) and incorporate other, broader visions into their endeavours, seeking to satisfy the interests of users, in line with the objectives of the approved policies. ●

THREE QUESTIONS FOR...

Vítor Poças, Chairman of the Portuguese Wood and Furniture Industry Association (AIMMP)

"With scale and management, forests generate value"

What do you think most urgently needs to change in countryside management in order to reduce the fire risk?
Portugal's forests will only be protected if they are economically viable and productive. Only a forest with value can attract investment, talent and management, bringing people to live in the countryside and securing better defences and protection, less criminal ignitions, more research and better biomass quality. In 2024, a total of 6 255 fires devastated 137 651 hectares — 82 thousand ha forests stands, 46 thousand hectares of scrubland and 9.5 thousand hectares of farmland.
These numbers show that the lack of management creates unbroken areas of fuel and multiplies the risk.
The second change is to ensure integrated management of the landscape, coordinating forestry, farming and wild areas, with inter-municipal and inter-sectorial coordination. The risk does not end or begin at municipal boundaries. September 2024 accounted for 92% of the year's burnt area, showing how extreme weather, structural failings and accumulated fuel lead to disaster.
The third is to ensure we have clear legal frameworks, which are effectively policed. Legislation, policing, investigation and punishment are centralised functions of the State. Fuel management, protection strips and forest maintenance only function if there are human resources and funding in the long term, and not episodic measures in the wake of each tragedy.



What is stopping Portugal from consistently applying the technical and scientific expertise it possesses?
The first obstacle is the fragmented ownership structure: millions of small holdings, many not actively used, render large scale intervention unfeasible.
The second is the lack of economic return: preventive practices and forestry work are expensive. Without appropriate incentives or value chains, smallholders obtain no reward from doing this work.
The third is constantly changing policies: there are plans and reports, but they change with each new government. What is needed is stability, multi-annual funding and coordination between ministries.
Lastly, we cannot ignore the human factor: arson and misuse of fire. In 2024, 34% of fires investigated were criminal in origin and 13% were the result of deliberate burning which got out of control. A further 40% were classified as "unknown cause", but in practice the great majority of these were due to arson.

Where can forest-based industries have the most positive impact?
Industry is the most significant channel for adding value to the forest and offers a route for transforming risk into economic value:
- It reclaims waste and biomass, which provides a return for undergrowth clearance and means fuel is removed from the forest.
- It promotes innovation and resilience, supporting species and forestry models better suite to our future climate.
- It establishes partnerships in the field, through management contracts, certification, good practices and awareness raising programmes.
- In addition, it has an active voice in shaping public policies, defending incentives which conciliate economics, sustainability and prevention.
In short: without economic value forests go unmanaged, without management there is no prevention, and without prevention there is no future for Portugal's forests. In order to generate value, it is necessary to combine smallholdings into larger units and manage the land. Because the forest does not burn alone: it burns when it is abandoned. ●

THREE QUESTIONS FOR...

Joaquim Sande Silva, Professor at Coimbra Agriculture School, Polytechnic University of Coimbra

"The most urgent thing is to manage the land"

What do you think most urgently needs to change in countryside management in order to reduce the fire risk?
The most urgent thing is to manage the land. Abandoned land which was once cultivated often go through a process of ecological change which increases the structural risk of fire and often leads to a degraded ecology, due to the expansion of exotic invasive species. However, it is easy to say that we need to manage the land, the difficult thing is to set this up. We have yet to discover ways of significantly increasing the percentage of managed land in Portuguese territory, and I doubt we will find any.
We have to distinguish between two types of management. Management of a production forest, as carried out with professionalism by cellulose manufacturers and a number of private landowners. There is also management for conservation purposes. This second option has the advantage, in the case of conservation of native forests, o enabling a transition to a state where management ceases to be necessary, as the system establishes its own balance thanks to the shade from the tree crowns. In addition to stepping up management for production purposes, we should invest more in conservation forests, due to the benefits in terms of defending the forests from fire, and the benefits from an environmental perspective, and also because this is a sustainable investment that will last over time.

What is stopping Portugal from consistently applying the technical and scientific expertise it possesses?
The reason is simple: we lack the viable management units, in sufficient number and of sufficient size, where our expertise could be applied. In other countries, a very large proportion of woodlands are publicly owned, meaning it is possible to plan forestry operations and apply scientific expertise. Other countries also have sizeable industrial forests, where professional management can also be implemented. We have none of this in Portugal. A significant part of the eucalyptus forests has been abandoned and there are almost no public forests, meaning that it is very difficult to take technical and scientific expertise out into the field.

Where can forest-based industries have the most positive impact?
Industry can have a positive impact on both industrial forests and on conservation forests. In industrial forests there are good examples, such as the Better Eucalyptus Project. Its only failing is not reaching a larger number of landowners. In terms of conservation forests, industry does very little. Investment in conservation forest should function as a price that industry pays for occupying vast areas with industrial forests. Industry can and should fund projects for rehabilitating native forests. At the same time, we need more incentives for ecological restoration of riverside gallery forests, as these can function as a barrier against fires alongside production forests. ●

"We have yet to discover ways of significantly increasing the percentage of managed land in Portuguese territory, and I doubt we will find any."

THE ANSWERS EXIST





THREE QUESTIONS FOR...

Nuno Calado, Wood Regulation & Sustainability Manager at Sonae Arauco

"Only with scale, organisation and arrangements based on trust will it be possible to ensure forests are more resilient"

What do you think most urgently needs to change in countryside management in order to reduce the fire risk??

Transformation of Portugal's forests requires a broad set of changes, applied on an integrated basis and supported by consistent, long-term public policies, which coordinate public and private investment. It will entail improving returns for producers, reducing the fire risk and guaranteeing supplies of raw material, considering that 98% of woodlands are privately owned.

The priorities will include restructuring land ownership and active management of forests and the countryside. The fact that land ownership is so fragmented, with tiny smallholdings and a large proportion of unregistered land, means it is difficult to buy and sell land and thereby combine holdings, putting a brake on private investment Combined management models have yet to establish themselves widely, especially in long-cycle species, which limits the scale needed to make management profitable and also heightens the perception of risk, in particular as regards recurrent fires. In order to overcome these obstacles, we urgently need to implement the recommendations of the Working Group for Rural Property and to implement complementary measures:

- Integration of BUPI (property registry services) into the land market, so as to identify owners interested in selling;
- Subsidised credit facilities or subsidies for purchase of rural properties for forestry purposes;
- Fast track for land transactions, free of charge and offering tax benefits;
- Stepping up the programme for combining holdings in vulnerable areas;
- Long-term agreements with forestry producers' organisations, creating Joint Management Areas which mobilise smallholders and enable investment.

Only with scale, organisation and arrangements based on trust will it be possible to ensure forests are more resilient.

What is stopping Portugal from consistently applying the technical and scientific expertise it possesses?

In the pine sector, the failure to apply technical and scientific expertise is due to the lack of a forestry extension network, the difficulty of accessing information, the lack of demonstration forests and insufficient training for landowners and forestry workers.

On its own initiative, and also through the work of other organisations to which it belongs (such as Centro Pinus and Colab ForestWISE), Sonae Arauco has made efforts to step up the transfer and application of know-how.

Where can forest-based industries have the most positive impact?

In a country where around 98% of forests are in private hands, it is essential to work in close collaboration with landowners, promoting better returns on their investment in order so that active forest management is more widely adopted. To this end, Sonae Arauco has invested in:

- Trials in Portugal of different species, from different origins and pine families - such as in the Gene Radiata project and rePlant. The aim is to provide forestry producers with plants presenting high genetic quality and better yields, able to boost returns along the entire pinewood value chain;
- Demonstration initiatives and transfer of know-how applied to management of pine forests, facilitating adoption of good forestry practices and forest improvement;
- Partnerships (risk sharing) or land rental to leverage private investment for active management.

AND AFTER THE FIRE?

When the fire is over, the land moves into the next phase: recovery. This is the moment to act quickly and make the right decisions. Protect the soil, avoid erosion, halt invasive species, choose what should or should not be grown again. The post-fire period is crucial. This is when it is determined whether the landscape will be reborn stronger or return to its cycle of abandonment.



How to regenerate a countryside in ashes

When the fire dies down, a new task awaits: soils need to be stabilised, water courses protected, invasive species controlled and a decision taken on where it is worth intervening. Specialists tell us that fires have the potential to be moments of transformation - the way the land is managed post-fire can decide whether it becomes more resilient or is again doomed to be abandoned.

When the fire is over, it leaves behind a blackened landscape. Everything is reduced to ash and silence, but the work is not over when the flames subside. In actual fact, it is after the fire that the most complex questions are posed: what to do with the exposed soil, with the at-risk water courses and with regard to biodiversity.

For Teresa Maria Gamito, the head of MONTIS, an association for nature management and conservation, and a specialist in territorial planning, the message is clear: “Fire is part of our world. At MONTIS we don’t work to eliminate fire, but instead to create resilience”.

MONTIS managed 313 hectares of land, corresponding to 38 properties, of which only 17 ha belong directly to the association; the rest of the area is managed on the basis of agreements with common owners, associations and private landowners. Teresa Gamito stresses that one of the main problems in Portugal’s forests is that land is abandoned and invaded by acacias. She adds that the fragmented ownership structure makes management difficult and complicates the purchase of land which could benefit from a more sustainable approach.

The association works on the basis of a conviction that fires are going to happen. The aim is not to eliminate them, but to reduce their impact. “We always think there’s going to be a fire. We aim for it to have as little impact as possible and we try to make our land more resilient”, Teresa Gamito explains.

This resilience is constructed in the field: creating clearings, establishing mosaics, reducing the fuel - all without destroying biodiversity. “We work with volunteers and forest fire brigades. We regularly clear the undergrowth, but always taking care not to damage biodiversity. We don’t believe in planting immediately after the fire. We wait until spring, to see what has survived”, she adds.

What to do next

After the fire, one priority should be emergency stabilisation, especially on hillsides and around water courses. “Rain straight after a fire can affect the burnt areas. The water washes away the ash, but above all the soil, which is a serious problem.”

This has two consequences: loss of fertile soil and pollution of any water courses running close to burnt areas, Teresa Gamito explained. She also pointed out that “the ash can also be beneficial as organic matter”.

And she gives the example of an area managed by the association, in Vieiro, which burnt one summer. “The next year, in February, the plants we thought had burnt grew beautifully. The ash, as organic matter, also helped in the reforestation. If the soil is not carbonised, the fact that it has burnt doesn’t have to be all bad”, she concludes.

The importance of making the right decision

For Luís Lopes, vice-chairman of MONTIS and a researcher in the field of forestry engineering, the work after a fire requires careful observation and choosing one of several options. “It’s important to know what existed before the fire, then to assess what happened in the fire, using this information to predict how the area may regenerate. It’s unlikely the whole area will need intervention. Some parts recover naturally.”

The approach taken by MONTIS divides into different stages. Straight after the fire, rapid action is needed: emergency stabilisation before the autumn rains, control of invasive species while they are easier to unroot, and regular visits to monitor what is happening. “There’s no

After the fire, the future is decided in the soil: stabilise, regenerate and choose carefully where to intervene.

set schedule. We try to keep up a presence on the ground and, as we can identify needs, we take action", explains Luís Lopes.
Come the spring, it is possible to identify what is regenerating naturally. The next summer, work starts on supporting the plants which have established themselves and deciding where to create clearings or introduce species. "We have an interval of five to six years in which the fire risk is lower. This is the window in which we can introduce/build up species we regard as helpful and decide on the future of the area", he adds.

Impact of fire on soil
For António Bento Gonçalves, professor at the Department of Geography at the University of the Minho, the post-fire analysis starts with recognising that there is not just one kind of fire. "Different fires will cause different impacts on the soil. The same type of fire on different soils can have different effects. It depends on various factors, such as the intensity. If the fire passes over quickly, it will have one particular effect. If it is slower, the continued heat in the soil will have different effects."
The relief, the vegetation and the soil composition all help to shape the impact. Even so, there are tendencies that recur. "Generally speaking, we can say that soils become more alkaline after a fire, which is an immediate constraint for certain forestry species. Many are adapted to slightly acidic, and not alkaline, soils."
The loss of nutrients is also a challenge after a fire: "Under certain conditions, nitrogen can be volatalised, and so soils can become poorer in certain macronutrients. I would especially highlight nitrogen, because it's a particularly important nutrient for plant development", he explains.
But all these challenges are also related to conditions in the field, any previous intervention and also the intervention after the fire. "Flatter land does not present such a high risk of run-off with the first rains, and so less nutrients will be lost. However, the scenario on hillsides is quite different. In these cases, the process of run-off is facilitated. Normally, we have a period of rain in the early autumn and this can seriously impoverish the soils. And of course, in much of the country's mountainous terrain, there are very thin layers of soil, with two, three or five centimetres at best. This run-off after the fires can further impoverish our soils, which then undermines our chances of having profitable production forests", António Bento Gonçalves explains.
This means that, after a fire, there are essential emergency measures. "Above all on hillsides, soils have to be protected to avoid chemical and physical losses, through material being washed away. Using burnt branches and trunks, we can create small barriers along the contours lines. This reduces the water speed so that materials can be kept in place", he argued. Another possibility is to correct the alteration in soil chemistry. "As the soils tend to become alkaline, we can sow species that can slightly acidify the soil. This would help to make forest stands more profitable in the medium term."
António Bento Gonçalves also pointed out that fire can amount to destruction or an opportunity, depending on how it is managed. The ancestral practice of controlled burning to regenerate pasture land is a positive example. "If fire is used properly, in the right conditions and in appropriate weather, it promotes rapid mineralisation which is beneficial for soils. This is why, after the first rains, the land provides lush pasture. The problem is when fire is not cold, but hot and prolonged", he explained.



A recovering plantation, cared for by MONTIS, six months after the fire.

AND AFTER THE FIRE?



Active forest management is crucial for resilience to fire and for improving the returns for landowners.

Working together to restore burnt areas

As part of the “Better Forest” programme, coordinated by Biond (Association of Forest-based Bioindustries) and included in the Transform Agenda, funded by the Recovery and Resilience Plan (RRP), a network of Pilot Areas (APs) and Demonstration Fields (DFs) has been set up for restoration of forest areas affected by fire. These initiatives fall within the scope of Biond’s operational programmes, which include “Clear and Fertilise”, a multi-annual strategic partnerships between forestry producers and industry, which grew out of the need to transfer technical know-how and good forestry practices to landowners and their organisation, but also for direct action in the field (approximately 100 thousand hectares benefiting from this work in the period 2019-2025).
These programmes reflect the observation that sharing knowledge is essential, but not sufficient in itself - it is necessary to implement good forestry practices and involve the people in the field in collaborative models. This is focused especially on areas where the land is owned by smallholders, often counted in the hundreds, whose plots are often abandoned or deficiently managed, making them vulnerable to fire.



Biond Programme in Mortágua: active management in burnt areas to restore the forest’s production potential.

Consistent intervention
After the major fires of 2017, the need for technical and financial support for rehabilitation of burnt areas became even more pressing, and efforts extended beyond the “Clear and Fertilise” programme. Several requests for help gave rise to a collaborative project, which involved local authorities, parish councils, local associations and, essentially, the landowners themselves, with the aim of restoring the production potential and to improve the resilience of the landscape. The first step was to identify landowners and their plots, a process that depended on a detailed survey of the land and institutional collaboration, as happened in Mortágua, Pedrógão and Castanheira de Pera, where local authorities played a crucial role, together with local associations.
Having identified the owners, it was possible to obtain their permission for felling the burnt wood, controlling invasive species and correcting the density of eucalyptus stands (selection of saplings), all of which operations were essential for restoring the production potential of the burnt areas. “The work was carried out at no charge to owners, funded entirely by Biond’s Burnt Land Recovery Programme (PRA). It’s based on a logic of proximity, transparency and simplicity, ensuring that all local actors are involved in the process”, we heard from António Sousa Macedo, coordinator of Biond’s operational programmes. “The results show that active management of the forest is crucial for resilience to fire and for improving the returns for landowners.”
By was of a concrete example, the work done in Nodeirinho (2021-2024), meant it was possible to halt the advance of the fire this year in Figueiró dos Vinhos. Also in Pedrógão, the replanting work (Replantar Pedrógão) carried out after the 2017 fire, in 2021/2022, created a network of corridors which, along with maintenance of fire breaks, contributed decisively to controlling the fire this year. “These cases prove that a well-managed forest, even though it may burn, is always more resistant and controllable”, concluded António Sousa Macedo.
Biond has restored areas in Mortágua (2021-2023), Pedrógão Grande (Nodeirinho, 2021-2024) and Derreada (still in progress), making a total of 1 500 hectares. ●

Replantar Pedrógão: reforestation work after the 2017 fire.

When fire destroys the value of forests

“The charcoal finds its way into the end product”

AND AFTER THE FIRE?

At RAIZ - Forest and Paper Research Institute, pulp and paper produced in the laboratory compared, step by step, the results obtained with healthy and carbonised wood. The findings were clear: the charcoal in the original word finds its way into the end product. Fire also devours the industrial value of the raw material.

Left, paper produced from healthy woods, compared with that on the right, produced using carbonised raw material: the shade of white and the contamination with particles of charcoal demonstrate the impossibility of using burnt wood.

The question was simple and direct: can burnt wood be used to make pulp and paper? In order to arrive at authoritative answer, RAIZ reproduced the industrial production phases in the laboratory, using two samples of eucalyptus, one from healthy wood and one from wood affected by fire.
The experiment replicated the main stages in the manufacturing process and the result left no margin for doubt, as soon as the first product - pulp - as obtained. The charcoal present in the burnt wood irreparably contaminated the pulp, altering its colour, composition and quality, rendering it unusable for industrial purposes in the pulp and paper sector.
In the cellulose pulp production process, wood is first broken down into small fibres, and the charcoal, because it is not easily soluble, is not efficiently eliminated. As they pass through the cooking, bleaching and purification stages, the charcoal particles remain intact or in small fragments, as they doe not react like wood in the chemical phases of the process.
In other words, they resist attempts to remove them.
Bruno Almeida, a laboratory technician at RAIZ, showed us a tray with two samples of freshly produced pulp, side by side: "Even after bleaching, there's a visible difference in colour", he explains, pointing to the darker shade of the pulp made using wood from a burnt area of forest.
From pulp to the next product, paper, the result becomes even more obvious. The charcoal particles are clear to see. Marta Casimiro, senior laboratory technician at RAIZ, showed us two samples of paper produced, one from healthy raw material and the other from carbonised wood used for the trial. One of the sheets is white, as you would expect of premium printing and writing paper, while the other, greyish in colour, is covered in black specks. "No one will accept office paper with these characteristics.... and no one is going to want to use a paper tissue that looks dirty to start with", she said by way of example.
"The charcoal in the original material gets into the end product", stressed Marta Casimiro, going on to explain: "The charcoal particles cannot be eliminated over the course of the process, and so they are clearly visible in the end product, which means it won't be accepted by the market".

From the laboratory to the mill

The trials conducted at RAIZ shows that it is not technically feasible to use burnt wood to produce pulp and paper, a fact which is well known in the mills.
Carlos Zurrinha, Industrial Director at The Navigator Company's Setúbal site, underlines that the presence of charcoal in the word "has a significant impact on the end quality of paper products, and also on the whole production process". He explained that "it is always complicated to separate the charcoal from the fibres and these traces find their way into the end product."
The machinery is also averse to charcoal. Carlos Zurrinha explains that the impact is felt not just in the end product, but also in the production process: "On the one hand, the charcoal residues accumulated in the process undermine the performance of the equipment and also weaken the structure of the fibres, prejudicing properties such as traction, and would lead to breaks in the paper machines". ●

RAIZ is one of the leading centres for R&D in the forestry and paper . Founded in 1996, by what were then two companies, Soporcel and Portucel, today part of The Navigator Company, it functions ion association with the universities of Aveiro, Coimbra and Lisbon. Recognised as belonging the National Science and Technology System and as an Interface Centre (Technology and Innovation Centre, TCI), RAIZ works on projects in collaboration with various Portuguese institutions. More recently, has taken a pioneering role in developing new forest-based bioproducts, able to substitute items currently obtained from fossil raw materials, thereby contributing to the wider global goals of decarbonisation.



Start of the cooking process at the RAIZ laboratory: comparative parallel test to demonstrate the effects of carbonised wood v. healthy wood.



Marta Casimiro: "The charcoal present in the raw material finds its way into the end product, meaning it will never be accepted by the market".



Eucalyptus globulus chips in the RAIZ trial.



Even after the pulp bleaching phase, the differences are still visible. The production process is unable to eliminate the traces of charcoal from the raw material.

Tight controls at factory gate and combating speculation



Because of the segments in which it operates, in particular printing and writing paper (top European producer and world leader in the premium segment) and Tissue (top Portuguese producer, 2nd largest in Iberia), Navigator applies stringent quality standards for the raw materials delivered to its mills.
The company has inspection procedures for rejecting any delivery of carbonised wood, and all of its industrial units are fitted with brightly lit gantries, used to conduct a visual check.
In addition, "workers receive specific training in how to identify raw material with traces of charring", we heard from Carlos Zurrinha. In cases where there are doubts after the visual inspection, a test is carried out using hypochlorite, which reacts to carbonised matter.
This tighter control at raw material reception has been implemented since last years, in the wake of the September fires, and was instituted in tandem with measures to support producers, seeking to cushion the losses, but also to limit speculation.
In a letter sent to suppliers in August this year, Navigator stressed that wood with traces of charcoal "is completely barred" from the production process and placed the tonic on support for the producers hit by the fires: in cases where wood from the areas affected by fire can be accepted, due to having no traces of charcoal, Navigator "with maintain the practice of not paying a lower price at its wood reception yards, and will not accept its partners paying a lower price for the wood to the landowners".
The company goes further in this letter to suppliers, stressing that: "as is our custom, we will not tolerate any attempt to take advantage of this situation which prejudices the forestry producers already badly affected by wildfires and we reserve the right to apply commercial penalties to anyone who is proven to engage in such a practice".
At the same time, Navigator announced in this circular to suppliers that it is implementing "financial and logistical support measures for forestry producers and suppliers to select and sort burnt wood from unburnt wood, so that they can increase the volume sold at the normal market price".
"At this moment, as ever, we should be united in our support for forests and all those who work in them and depend on them", The Navigator Company concludes. ●

After the fire: natural regeneration or intervention?

By Otilia Correia, Researcher at cE3c – Centre for Ecology, Evolution and Environmental Change, University of Lisbon

Fires, whether of human origin or otherwise, have shaped Mediterranean vegetation since early times, favouring species better adapted to fire, i.e. which burn and propagate fire very easily, but which also recover rapidly, being highly resilient to this factor.
Mediterranean vegetation, together with coniferous forests and savannas are the ecosystems most susceptible to fire, as these are communities comprising highly inflammable species and which accumulate a large quantity of biomass.
The capacity of species to withstand fire is associated with various mechanisms for post-fire regeneration: i) shooting from underground organs (roots, stumps or from the trunk, bulbs or rhizomes), ii) germination from the seed bank in the soil or in the crowns of trees in protective ligneous structures, where germination is stimulated by fire. Some species also have a hybrid strategy, combining two types of regeneration - shoots and germination.
After the fire, the vegetation structure is altered for only a very short period and species reestablish themselves very quickly, in a process of natural recovery of communities, known as autosuccession.
In most cases, in view of the ability of species to regenerate, the most sensible approach is to allow communities to recover naturally and, in certain situations, to complement this by planting forest species less susceptible to fire, such as broad-leaf species, helping to create more resistant and resilient forests.
The need to develop recovery measures should be based on identifying high-risk situation impacting the affected ecosystems, and it is useful to start by identifying the most vulnerable areas in terms of degradation and their regeneration capacity, i.e. their potential for autosuccession. Ecosystems which demonstrate a low level of spontaneous regeneration and which tend towards irreversible degradation (or slow recovery) should be the prime targets of restoration efforts.
Restoration of burnt areas should include conservation of resources, assets and services provided by the affected ecosystems, such as i) soil and water conservation, ii) boosting the capacity of ecosystems to recover and prevent fires, iii) enhance ecosystem and landscape quality (promoting biodiversity and its resilience).
Post-fire intervention should set out to reduce surface run-off and soil erosion, in order to avoid collateral effects (floods, landslides and sedimentation in rivers and reservoirs) and to help ecosystems recover. The action most commonly taken to reduce surface run-off and the risk of erosion and to promote infiltration: i) sowing (aerial or otherwise) and then covering the ground with straw or other materials (mulching), ii) placing and securing logs along contour lines, iii) installing barriers to retain sediments, iv) construction of small dams with stones, sandbags or bolsters, so as to promote water infiltration, v) digging trenches along contour lines and covering with organic blankets. In order to promote autosuccession, sowing and/or planting can be used.
When sowing, a mixture of seeds of native species growing to different levels should be selected, for example fast-growing herbaceous, graminaceous and leguminous plants to protect the soil, as well as shrubs and trees which will ensure secondary succession in the vegetation. In the case of young pine woods, natural regeneration can be difficult, as seeds have not yet been produced, and in this case sowing, combined with mulching, will be the most appropriate technique for aiding recovery.
In the case of plantations, avoid large single species plantations, investing in mixed plantations of hardwood and conifers. New plantations of trees and shrubs should promote a lower fire risk and increased resilience in the event of further fires, and also be provided with fuel management strips.
There is no doubt that forest fire prevention should entail management of the fuel load in woodlands, through controlled burning, pasturage and clearance of undergrowth, which should be considered in the light of the specific situation in each instance. ●

New plantations should promote a lower risk and increased resilience, and also be provided with fuel management strips.



AND AFTER THE FIRE?



It is imperative to implement measures to create larger property units, better suited to professional management.

Summer 2025, a tragedy (foretold)

By Maurício Teixeira Marques, Member of Parliament

The year 2025 brought a tragedy which has saddened us all. We owe a special debt of gratitude to those who fought the flames, in particular our fire brigades, security forces and the people of our interior regions. Many of these communities were frequently left to their own devices, and it was thanks to their efforts and dedication that the consequences were not even more devastating.

For all the victims, we express our deepest sorrow and our solidarity with their families and friends.

The adverse weather conditions we experienced this year contributed significantly to the scale of the fires. However, it was not just these conditions, or any forestry species in particular, which caused the magnitude of what was a tragedy waiting to happen.

The fact is that the lack of forestry planning, the abandonment of rural properties and the accumulation of combustible vegetation, often comprising scrubland and invasive species, have transformed vast areas into powder kegs, in a context of ever hotter and longer summers.

Knowing that around 98% of rural property is privately owned, much of it with no known owner, highly fragmented into often tiny smallholdings, especially north of the Tagus, it is clearly difficult to promote environmentally or economically sustainable management of forests.

It is therefore imperative to implement measures to create larger property units, better suited to professional management, so that forests can be economically and environmentally sustainable.

From an economic point of view, to guarantee income for their owners, fostering employment and the economy in underprivileged regions.

Environmentally, because only properties of sufficient size can be managed using a diversity of species, better adapted to the soil and climate, promoting biodiversity. I refer to the fauna and flora which provide real natural barriers to pests, diseases and fires.

Effective management of the countryside will never be possible if we do not know who owns it. There is accordingly an urgent need to identify the owners of rural land, completing the land registry and creating procedures for managing land without known owners, using the different data bases available, including tax authority records. It is fundamental to combine units, creating larger properties, so that forestry management can be an economically viable and sustainable activity.

One of the main challenges is to promote investment in forests, in particular by creating tax breaks. Measures which simplify the formalities for legally transferring ownership, such as tax exemptions for acquisition of neighbouring properties, could help to encourage the creation of larger properties and combat fragmentation. This would pave the way for economies of scale and improved returns from forestry operations.

It is crucial to speed up and simplify the process of buying land, enabling plots to be combined on the basis of the tax authorities' records (however limited), and enabling the buyer to generate a single ownership document (BUPi) combining all the original plots, after acquisition.

Simplified legislation, with decision-making powers on forestry ventures concentrated in a single authority, would be a major stride towards promoting investment and significantly boosting prevention.

We cannot speak of forests without raising the issue of the carbon market, which is a new opportunity for increasing the incomes of forestry landowners. Here too, accurate information on ownership and a completed property registry are essential if these opportunities are to be seized effectively.

Investment in forests today will have a decisive impact on the forests of tomorrow, not just on wealth creation, but above all on reducing the costs of fighting the fires which, year after year, devastate our countryside.

Forest recovery after wildfires: challenges, memory and the future

By Pedro Bingre do Amaral, Professor at Coimbra Agriculture School, Polytechnic University of Coimbra

The worsening of forest fires in recent decades should be viewed as a prologue to a new era in rural territory, shaped not only by climate change, but also, and above all, by the new socio-economic reality. Depopulation, the abandonment of farming and the transformation of production dynamics have profoundly altered the relationship between communities and the countryside. The flames which today consume vast areas of woodlands are, simultaneously, a sign of the times and a call for us to rebuild the landscape, challenging the country to rethink how it manages, occupies and values its territory.

The history of Portuguese forests is largely the history of humanity's relationship with its territory. Since the Iron Age, starting almost three millennia ago, human pressure on forestry resources has been keenly felt. The advent of farming and pastoral systems, combined with the use of wood for metallurgy and construction, triggered a process of systematic deforestation. Native forests - of oak, cork oak, holm oaks and other native species - were gradually replaced by farmland and pasture, radically changing the ecological structure of the territory.

It was only in the second half of the twentieth century that Portugal embarked on what is called the forestry transition, consisting of gradual recovery of its tree cover, after centuries of deforestation. This process was possible thanks to far-reaching technological and economic changes, which included the invention and dissemination of synthetic fertilisers, which revolutionised modern farming. By allowing natural manure to be replaced by chemical fertilisers, these products enabled farmers to dispense with the large herds needed for produce the manure, reducing their dependence on sheep and goats - historically one of the leading contributors to the degradation of Mediterranean forests. As a result, vast areas of the countryside, previously subject to pressure from grazing, became available for natural regeneration and for new plantations. However, this recovery was based above all on forestry ventures centred on maritime pine and eucalyptus, for wood and paper pulp. At the same time, the abandonment of farmland and the economic decline of rural areas led to the spontaneous proliferation pyrophytic shrubs, such as broom, heather and gorse, which took over both vacated farmland and countless abandoned forestry plantations. These highly inflammable plant formations created a dense and unbroken landscape of fine and dry fuel, which has been the main cause of the megafires in Portugal today.

This has meant that forest fires have become one of the largest threats to sustainability of the country's territory. Every year, tens to hundreds of thousands of hectares are burnt, affecting not only the forest, but also soils, biodiversity and human communities. After the fires, regeneration of native forests - comprising species such as the Portuguese oak, arbutus, chestnut, cork oak and holm oak - is essential in order to restore the ecological balance. These species are suited to the Mediterranean climate and have natural mechanisms for regeneration, such as shooting from the roots or the base of the trunk.

However, natural recovery is not always enough. In many affected areas, the soil is impoverished and subject to erosion, and invasive species (such as acacias) compete with native plants, hindering regeneration. In these contexts there is a need for active and planned forestry management (either for production, or for multiple uses), that can mitigate both the erosion processes and biological invasions.

One of the most effective strategies for reducing the fire risk and restore the ecological balance is to divide up the landscape. The countryside should be reorganised into multi-functional mosaics, including different types of use and ground cover, where production forests are conciliated with native forests for multiple uses, montado (savannas of cork, holm and Portuguese oak) and extensive pasturage.

Restoration of Portugal's woodlands should therefore not be limited to replanting after fires; it also entails building a forestry landscape (potentially reinforced by using sustainable forestry certification schemes) which promotes good management practices and ensures that commercial forestry is conciliated with ecological conservation.

After centuries of deforestation and decades of intense transformation of the landscape, the recent abandonment of farmland and forest plantations has left vast areas at the mercy of spontaneous ecological developments and fire. Investment in diversification of the countryside to create a patchwork of uses, built around native species and multi-functional uses of woodlands, along with production ventures, is to invest in a future where the rural economy, ecology and cultivation of the countryside can coexist in a sustainable and lasting way. ●



Dividing the landscape into a mosaic is one of the most effective strategies for reducing the fire risks and promoting restoration of the ecological balance.

Rebuilding territories, valuing resources and avoiding the mistakes of the past

By Gonçalo Almeida Simões, Director-General of Biond

Sustainable forestry management is a strategic imperative for Portugal which continues to lose its forest cover - a loss provisionally assessed at 280 000 ha in 2025 alone. This represents a huge cost to the country in terms of lives, biological assets, carbon sequestration capacity and raw material, but also CO2 emissions in the order of 1.7 megatons. In this context, Portugal's environmental targets, under the Paris Agreement, are practically a mirage, for which the installation of solar panels on a massive scale, causing deforestation, is clearly not the solution.

Sustainable production of wood and other wood products is of course one of the responses to the scourge of wildfires, because if the potential returns are sufficient, there will be ever more forestry landowners eager to manage their properties, reducing the risk of abandonment - in a context where 97% of forests are in private hands.

However, in order for Portugal's forests to achieve their potential, we need to do better, restoring and increasing the area of woodlands, which has been devastated year after year. This entails selecting the best genetic materials, advanced silviculture practices and risk mitigation measures, ranging from prevention and fire-fighting to control of pests and diseases. The bioindustry represented by Biond has provided support and shared know-how on all these fronts, through its Operational Programmes.

Unfortunately, the experience of recent decades points to a worrying paradox: yields from Portuguese forests, particularly eucalyptus, have fallen, despite the available scientific and technological expertise, which would permit sizeable gains. There are two explanations for this decline. In the first place, far-reaching changes in rural society, which has abandoned traditional uses of the forest; and secondly, a worrying perception, albeit unfounded and only among a minority of people, that commercial forestry management brings risks. We have accordingly reached a situation where paralysis has resulted in the burnt area which keeps on growing in the statistics, and is visible in more abandoned countryside.

The result is that Portugal's inland regions are increasingly depopulated and vulnerable, despite the country's professed policy goals of territorial cohesion. But territorial cohesion is not something that can be legislated into existence; instead, it mean breathing new life into the local economy, and in particular into forestry.

Forest plantations are a cornerstone of this local economy, helping the leverage a country with the potential to lead the European bioeconomy - but which is still trying to grapple with the huge problem of the shortage of raw material. Portugal is uniquely placed to lead the way in eucalyptus growing, from technology and genetics to know-how transfer, enabling it to generate innovative bioproducts with high levels of value added. But this potential runs into serious constraints, such as the scarcity of raw material, which undermines the sector and means wood has to be imported, at high cost, preventing the expansion of biomaterial, biofuel and biochemical clusters, entirely viable on the basis of the country's planted forests.

The abandonment of forest holdings and review of the legal framework applicable to forestation and reforestation (RJAAR) after the 2017 fires have exacerbated the situation, disregarding structural causes such as the rural exodus, ageing of the rural population, poor returns and climate change. Portugal today is faced by fragmentation of its territory, with only 46% of woodlands actually registered and more than 20% without any known owner.

Territorial planning and incentives for management are urgently needed. To that end we need to create larger-scale units for production, by encouraging associations and forest co-ownership, to increase yields and encourage people to stay in the countryside.

It has been empirically proven that management radically alters the reality on the ground. Biond's Operational Programmes, such as "Clear and Fertilise", are evidence of this. Between 2019 and 2024, in areas covered by these programmes, wildfires were reduced by a factor of 3.3, showing without room for doubt that a well-managed forest is more productive and more resilient to fire.

Portugal has a unique industrial cluster, with the ability to generate a wide range of products (from pulp, paper and cardboard to biofuels and biomaterials), and to compete globally, replacing fossil-based products. On the strength of R&D, accumulated expertise and technological modernisation, it is possible to boost yields in plantations by more than 50% on some plots, promoting a low-carbon circular economy.

The future of the Portuguese forest calls for vision, action and innovation. Land use planning, attaching value to resources, encouraging higher yields and sharing knowledge are fundamental steps to rebuilding what fire and abandonment have threatened. The forestry bioindustry is ready to take the lead - not just in production, but in creating lasting environmental, economic and social value. The time has come to avoid the errors of the past a built a resilient, productive and sustainable forest - able to act as a driving force for development of the country as a whole.



Land use planning, attaching value to resources, encouraging higher yields and sharing knowledge are fundamental steps to rebuilding what fire and abandonment have threatened.

THREE QUESTIONS FOR...

Dina Duarte, Chair of the Association of Victims of the Pedrógão Grande Fire

"Wildfire-affected communities lack psychological support"

What's the absolute priority after a major fire??
From my point of view, as someone who has always lived in villages, the priority should be damping down operations and felling the burnt wood, except for fire-resistant species. I mention this exception because, after the fire of 17 June 2017 in Pedrógão, I saw cases of trees that came back to life - fruit trees (citrus fruits), arbutus, olive trees, cork oaks and others.
The removal of trees killed by the fire makes it safer for people whose lives take them through the burnt areas and enable ground level vegetation to recover when the first rain falls. In addition, it prepares the land for replanting with new trees, for those who want to and can.
In 2017, we spent too long surrounded by burnt trees, some only fell with the strong winds in winter, others were felled later, and eights years on, some are still standing. The clearance and felling of burnt trees, allowing the landscape to turn green again, are also fundamental for local people to return to a positive mindset. As well as traumatic, the black cloak left by fire is deeply depressing.

What are the most common failings in the aftermath of a fire?
There's a lack of damping down operations, above all in burnt areas close to villages. From a human point of view, communities that live through fire need mental health services. Very often, people have lost family members, friends, pets or livestock - which in turn no longer have anywhere to graze.
For people who don't live in the countryside it might not appear important, but animals - domestic and wild - are part of our daily lives. All lives matter and should count.

What recommendations would you make to decision-makers?
We need legislation or programmes which, in the aftermath, enable Forestry Associations or local authorities to take on the organisation and management of woodlands, with the consent of landowners, or without it (for land which is abandoned or has no known owner).
I think it is fundamental to establish Village Co-Ownership in all villages, with clear criteria for planting: species that slow down the approach of fire around settlements, protection of springs and streams, and respect for natural biodiversity. The other trees should be planted in an orderly way, with space for wide roads and fire-breaks, so that fire engines have easy access and can help stop the flames from advancing.
There should also bee wildlife sanctuaries, where wild animals can live at a distance from villages, so that village people can grow their vegetables undisturbed.
I repeat: I am just someone who was born and has always lived in the countryside, with no specialist technical or forestry knowledge, but the experience of having grown up in the hills, surrounded by trees of every type. ●



AND AFTER THE FIRE?



THREE QUESTIONS FOR...

António Loureiro,
Mayor of Albergaria-a-Velha (2013-2025)

"The aftermath of a fire should be regarded as an opportunity to build back more resiliently"

What's the absolute priority after a major fire?
The absolute priority after a major fire is to ensure the safety of local people and the operational teams on the ground. At the same time, there has to be quick but coordinated assessment of the damage, and work to stabilise the areas affected, so as to guard against secondary risks, such as landslides of contamination of water resources. It is fundamental to provide immediate support to communities - emotional, social and economic - taking steps to ensure an effective and sustainable recovery.

What are the most common failings in the aftermath of a fire?
One of the main failings in the aftermath is the lack of a joined-up approach and poor coordination between different authorities. When the emergency is over, outside interest quickly wanes, causing areas to be abandoned and to the lack of structural measures for recovery. The lack of stable funding, the low level of local involvement in decision-making and the lack of ongoing assessment mechanisms undermine the effectiveness of the response, leaving the area more vulnerable to future events.

What recommendations would you make to decision-makers?
I would tell them that the aftermath of a fire should be regarded as an opportunity to build back more resiliently:

- Implement procedures for a coordinated and long term response, involving civil protection, local government, the environmental sector and civil society;
- Ensure ongoing funding for ecological and socio-economic rehabilitation;
- Promote management of the landscape with a wide range of land uses and attaching value to multifunctional forests;
- Value local knowledge, empowering and involving communities in the solutions;
- Ensure transparency and systematic assessment of recovery processes.

In Albergaria-a-Velha, some of these recommendations have already started to be implemented. Since September 2024, the local council has adopted several mitigation measures, most notably:

- Cooperation with the Portuguese army in creating strategic forest tracks (Valmaior–Sra. do Socorro, Fontão–Marridas, Frossos–Maridas) and clearance and restoration work along 8 km of tracks.
- Creation of new "Safe Village, Safe People" areas (Gavião and Porto Riba), and maintenance and awareness raising in those already established (Carvalhal, Fontão, Vilarinho de São Roque, Vila Nova de Fusos).
- Implementation of Local Civil Protection Units (ULPC) in civil parishes; delivery of forestry kits and awareness raising activities.
- Expansion of the Municipal Civil Protection Service, including purchase of equipment, video surveillance system and young people's country and forestry volunteering scheme.
- Building forests tracks resilient to winter weather, with the Cement Soil Project.
- Forestry Projects for ecological rehabilitation, control of invasive species, restoration of infrastructures and water courses.
- Planting of more than 42,000 native trees
- "Safe Industry, Safe Community" Plan, with survey and planning for risk mitigation in the industrial zone and creating the role of Emergency Manager.
- First steps to setting up four Village Co-ownership schemes.

THREE QUESTIONS FOR...

António Arnaut, Forestry producer

"The criminals who set fire to our forests need to be caught"

What's the absolute priority after a major fire?
Assess the damage, investigate the cause of the fire and decide what to do to minimise the damage. It's fundamental to fell the burnt trees and get them off the land as quickly as possible. Then it's important to mobilise the soil to work in the ash, combat erosion and avoid the next rains from washing the ash and fire waste into water courses, helping to pollute them.

What are the most common failings in the aftermath of a fire?
We don't have buyers for burnt trees. At a fire, there is surplus supply and forestry service providers can't keep up with the demand for them to fell and remove the burnt trees from the land as quickly as would be desirable, so as to enable the owner to do the necessary work as soon as possible. The market is destabilised: supply overtakes demand and prices drop.

What recommendations would you make to decision-makers?
Not to take refuge in the idea, often transmitted by the media, that fires can be blamed on the failure to keep farmland, rural and woodlands free of excess fuel. It has been statistically proven that a large percentage of fires are criminal in origin (around 42%) and that these fires, for example, in 2024, accounted for 84% of the burnt area in Portugal. So I would suggest: they should combat crime, police forests, farmland and the countryside, with constant patrols of these area so as to catch the criminals who set fire to our forests.
Don't blame eucalyptus trees - that is a theory that only reveals ignorance of the subject. If they look carefully at managed areas of eucalyptus production, they'll see that fire spreads much less in those areas. Invest more in surveillance and first attack brigades: the earlier we attack a fire, the more likely we are to put it out. I think there also needs to be more coordination between the command structure for a major fire and the local fire brigades: these are the ones with local knowledge of the terrain where the fire is burning, who are familiar with the prevailing winds, access routes and the best places to fight the blaze. We often seen that the person in charge of fighting a fire is largely unfamiliar with the local terrain, which is no help at all.



"A large percentage of fires are criminal in origin. We need more policing, with constant patrols."

AND AFTER THE FIRE?

THREE QUESTIONS FOR…

Luciano Lourenço,
Full Professor (retired), University of Coimbra

“We need plans for joint rehabilitation of each large area burnt”

What’s the absolute priority after a major fire??
Fell all the dead trees left standing and send them for appropriate use. Timber with commercial value should be sent for processing. Materials without commercial value can be transport to chipping units which can make use of them. When this is not feasible, due to the distance of the difficulty of extraction, they should be placed as barriers, both at the head of water courses and along the slopes on either side, in order to slow down run-off from rainfall, thereby reducing the consequent erosion. In this case, whenever it is possible to chip it on site, it should then be spread as evenly as possible over the slope.

What are the most common failings in the aftermath of a fire?
Everything or nearly everything. It normally takes too long to fell the burnt trees, and above all to rehabilitate the burnt area. For this to be viable, there has to be specific and objective plan, setting out the main thrust for joint rehabilitation of each large burnt areas. This should be easily adapted to creating management units with the potential for profitability, and it should be easily and quickly adapted to each of them, so that it can be implemented in the six months after the fire, and then enable the burnt areas to gradually become self-sustainable, and consequently able to be defended against further fire, which will entail a new law of approaching the aftermath and resolving the problems of large burnt areas in the post-fire period.

What recommendations would you make to decision-makers?
- Put into practice the expertise acquired over the years, with regard to prevention, fire-fighting and rehabilitation.
- Don’t think of major fires as inevitable, let alone as a consequence of climate change, as they have always existed and will continue to exist! They may be a calamity, but don’t let them be seen as inevitable, as would suit certain interests.
- Don’t define technical, scientific and linguistic concepts in new laws, decree-laws and other legislation, which alter the traditional meaning of terms that have long been used, as was the case of transforming “forest fires” into “rural fires”, or attributing to certain concepts a meaning different from that which has long been accepted and with which they are used by the general public. Instead, use words with the correct and accepted meaning, resisting the temptation to borrow unnecessarily from foreign languages. The words exist in Portuguese, and should be used with their vernacular meaning, not only to avoid the meaning these terms being used in garbled fashion, but also so that they can be easily understood by the general public.
- This is an issue that might appear trivial, but it is much more important than often thought, especially be those who lack translation skills, although there is no space to expand on this here.
- Rethink the fire-fighting strategy, i.e. how forest fires are attacked, in particular in terms of:
  - Aims, deriving from the concept of “forest fire-fire-fighting”;
  - Priorities, defined for each operation, without of course jeopardising the safety of:
    a) Fire-fighters, who should use and take advantage of existing infrastructures (roads and forest tracks, fire breaks and fuel management strips,…) as the starting point for safe fire-fighting, and also use other resources to extinguish fires, other than water, such as bulldozers and other heavy machinery, deployed appropriately;
    b) People (residents and others), whilst we all know that the best way to defend them is to fight the fires in the forest, putting out the blaze before it gets close to houses. When this does not happen, it can sometimes move towards houses in a very threatening way, which can be avoided, if the fire is fought far from the houses, minimising the risk and not endangering people and property, as regrettably has become commonplace.
  - Create a legal framework for large burnt areas which makes it possible to transform them into opportunities for re-establishing woodlands, preferably for multiple uses, catering for the different functions: production, protection, conservation, pasture game and fishing, recreation, landscaping. ●

“In the aftermath of fires, everything or nearly everything is neglected. It takes too long to fell burnt trees, and above all to implement restoration measures.”





António Redondo
CEO of The Navigator Company

Portugal and fire: from storytelling to the solutions

Complex problems cannot be solved by simple answers
The issue of wildfires in Portugal is a multifactorial phenomenon of enormous complexity, as has been made clear in the pages of this edition of My Planet. To interpret it from a single perspective would not only be wrong, but it would severely constrain the design of public policies and solutions able to tackle this serious problem.
We have given over this magazine to the voices of researchers, experts and professionals in the sector, who have brought their know-how, experience and complementary visions of a problem which requires a collective and multidisciplinary approach. I am grateful to all of them. Together, these different understandings form the foundation for designing balanced and lasting responses to the challenge of fires.
There are countless factor that contribute to this problem, which we can group under at least five basic headings: land ownership, society, economics, management and territorial organisation. These have been joined in recent years by a "new" dimension: the variability of the climate. Even if we disagree about the causes, the phenomenon is undeniable and seems to be getting worse. In the first five topic areas, public policies can be designed and applied which, over a timeframe of several decades, can substantially attenuate the problem. As to climate variability, mitigation, if possible, has to be global, slower and with much less predictable results.
This enables us to draw two preliminary conclusions:

1. complex problems cannot be resolved with simple or single-factor solutions - there is no silver bullet; action is required in all the dimensions contributing to the problem;
2. the variability of the climate is amplifying the effects of all the other dimensions, increasing the frequency and intensity of fires, and also the urgency of adopting appropriate measures.

A problem on this scale requires the responsible involvement of multiple stakeholders, but it falls to the State, acting through the successive governments we elect, to take the lead and make choices for society as a whole. In a topic of such scale and wide-ranging importance, choices have to consider the collective good of all generations and not just the party political and ideological interests of the parliamentary supporters of the government of the day. We must demand that decision-makers weigh up the interests on the basis of facts (in science or technical disciplines) and not in response to ideological beliefs or fear of what is called public opinion, but which more often than not is the lobby of "published opinion". We should also demand that forest policies not be changed to reflect the ideological preferences of the latest government, but be adjusted in keeping with the forest's own timeframe - measured in decades - rather than electoral cycles, which are getting shorter and last just a few years.

Creating a "culprit" to divert attention
In order to shirk responsibilities and explain what cannot be explained - the State's inability to organise its territory, to address the question of fragmented land ownership in many areas of the country (especially north of the Tagus), to enforce the copious legislation which has regulated planted for decades, to respect private property, to find solutions for the economic ruin of the countryside, to protect public property and, above all, people's lives - scapegoats are often found in an attempt to divert attention from the real issues.
These scapegoats are created by sticking to a rulebook long used in other situation: design a simple narrative (particularly efficient if it conforms established prejudices, such as urban myths), use emotional appeal, define strategic timing, repeat the message constantly (preferably in the online echo chamber) and use "reliable sources" to propagate it, like well-known faces, even if they lack any technical or scientific qualifications for speaking on the subject, in the mass media. For decades, the scapegoat has been a single forestry species - eucalyptus! But because, over the years, the facts in the field suggest otherwise and science also declines to

The difference made by management is visible in the landscape: the Arouca fire, September 2024; fires spread through 13 526 hectares until it reached the holdings managed by Navigator, where its intensity diminished and it stopped spreading.

REFLECTION

support the “published opinion”, this narrative starts to vacillate and new scapegoats are then tried out - always using the same playbook.

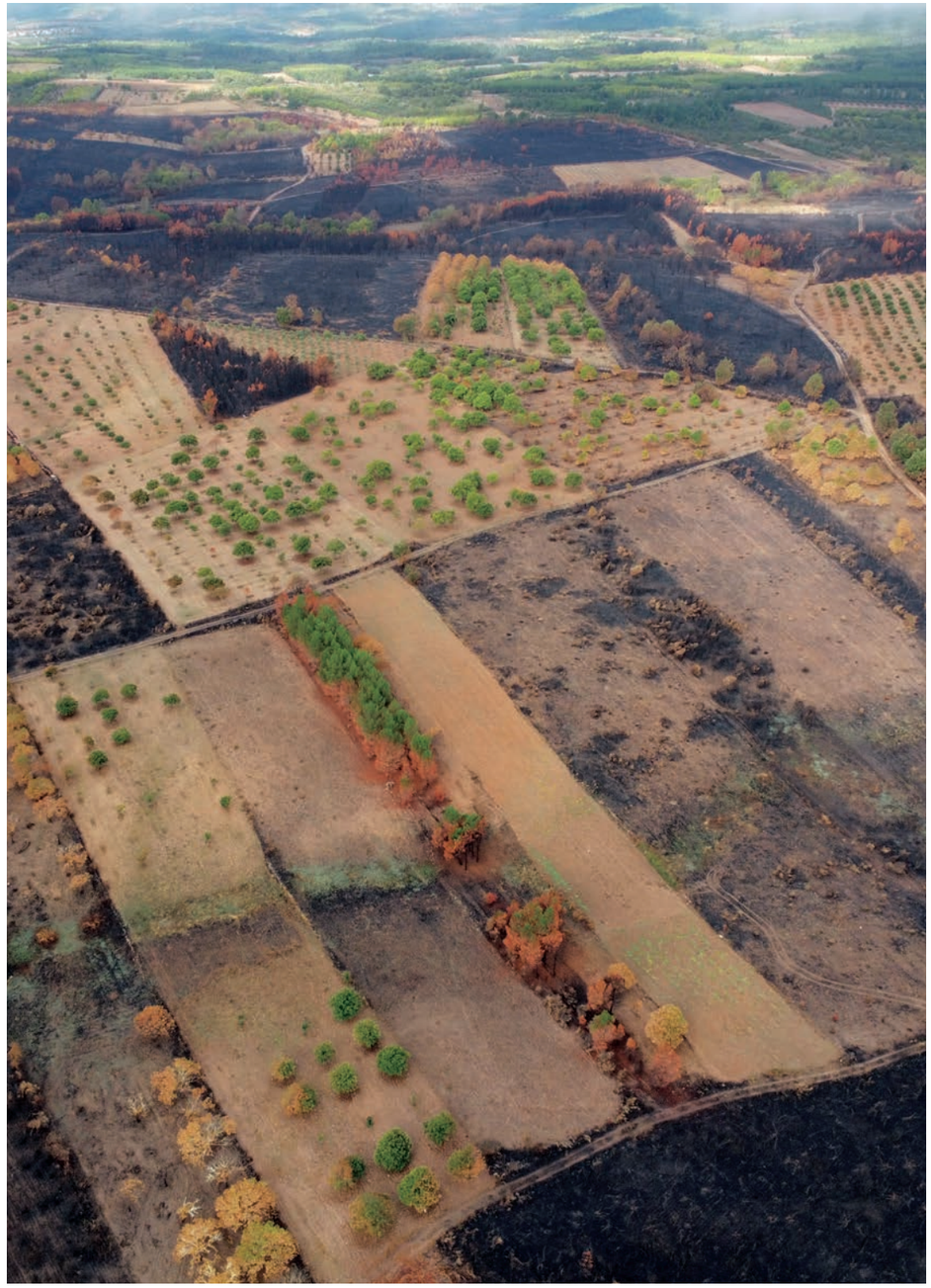
Fires in the Mediterranean landscape: a history of adaptation and change

Before we go on to discuss some of the more relevant dimensions enumerated above, we should first look back at history, which I hope will help us to arrive at a broader understanding.

Fires have been a constant presence in the Mediterranean region for millennia. The characteristic Mediterranean climate, which has been growing more extreme (a rainy season with relatively moderate temperatures, encouraging the growth of highly inflammable scrubland vegetation, followed by long, hot and dry summers, and strong seasonal winds) creates an environment naturally conducive to fire. In a context of high primary productivity, favouring the growth of biomass, the presence of wide areas of scrubland with little tree cover, or unmanaged groups of trees, encourages the development of rockrose, heather, broom and gorse - a flora featuring fine fuel that easily burns and even benefits from fire, because, in some cases, its seeds germinate more easily with the heat of fires, therefore making them the cause of those fires. But it was above all humanity which incorporated fire into management of the territory from pre-history onwards. Pre-historic peoples already manipulated fire to encourage game and stimulate the growth of edible plants. With the agricultural revolution, around ten thousand years ago, fire became essential for preparing soils and managing pasture.

In Classical Antiquity, the Greeks and Romans used fire strategically and conducted controlled burns, distinguishing between cultivated fields (ager), pasture (saltus) and woodlands (silva), each with specific rules for using fire.. Theophrastus, a Greek philosopher of the 4th century BC, a disciple of Aristotle and the father of botany, wrote a treatise entitled De Igne (“On Fire”), in which he acknowledged that fire could be beneficial - “domesticated” - or destructive, “wild” - depending on whether it was managed correctly or not by man. In 1197, a large fire on Mount Athos, in Greece, was recorded in chronicles, showing that extreme events, although rare, left lasting marks. During the Middle Ages, fire continued to be a core tool for the Mediterranean rural economy. For farmers and shepherds, burning was a regular practice, part of the agricultural year. However, governments started to regulate its use. In Crete, for example. the Venetian Senate issued a decree in 1414 to protect the native cypresses, which it was prohibited to burn in the mountains. In Sardinia, the “Carta de Logu” (late fourteenth century) required the creation of fire breaks - strips cleared of vegetation - around settlements, to prevent fires from reaching the houses. These measures show that, even in the Middle Ages, fire was seen as both a useful tool and a potential hazard.

The climate characteristic of the Mediterranean, which has been getting worse, creates an environment naturally prone to fire.



Mosaic area (without eucalyptus), where fire consumed approximately 2 200 hectares of chestnut and cork oak woodlands, scubland and farmland..

From traditional farming to the abandoned landscape

With the modern age and industrialisation, the relationship between society and fire changed. Mechanisation of agriculture reduced dependence on traditional practices such as burning, urban migration and emigration to other countries (especially in southern Europe) accelerated the rural exodus, leaving last tracts of farmland and pasture without active management. The result was the uncontrolled growth of spontaneous vegetation - scrub, woody shrubs and even trees - replacing the old rural mosaic. This change created unbroken landscapes where large quantities of biomass accumulated, in highly inflammable form, where any ignition could easily evolve into a large-scale fire.

In addition to these social and economic factors, the revolution in 20th century farming, which saw the introduction of synthetic fertilisers thanks to discovery of the Haber-Bosch process, which permitted industrial production of ammonia and nitrogen fertilisers in Germany as from 1913, had a far-reaching impact on the structure of the rural Mediterranean landscape. Industrial production of fertilisers meant that yields could be boosted from the best farmland, rendering obsolete many traditional processes such as controlled burning for fertilisation with ash and systematic application of animal manure. With the intensification of agriculture in more fertile areas, more marginal areas and uplands were gradually abandoned, and ceased to be cared for by farmers and shepherds.

This chemical process also affected the pastoral economic: manure lost value as a fertiliser and less brushwood needed to be collected as bedding for livestock, reducing the pressure on scrubland and pasture and causing more spontaneous biomass to accumulate. As a result, the reduction in extensive grazing and collection of brushwood also contributed to out of control growth in wood vegetation and shrubs, creating a larger unbroken area of plant fuel.

Technological innovation in farming, with mechanisation and fertilisers, radically transformed the rural economy, pasturage and land use, which indirectly contributed to the new fire regime characteristic of the contemporary Mediterranean landscape: less controlled burns, more accumulated fuel and a greater risk of large-scale fires.

A reduced human presence, the dying out of ancestral practices and the legal limitations or bans on traditional burns all contributed to a situation where communities have lost control of fire, aggravating the risk. Today, it is also essential to recover this ancestral know-how in order to face the modern challenges of wildfires. This means investing in territorial planning, controlled burning, reforestation, continuous monitoring and community education, helping people to live sustainably with fire. The future of the Mediterranean landscape depends on intelligent and integrated management, recognising fire not just as a threat, but also as a natural

For decades, the scapegoat has been a single forestry species - eucalyptus. But because the facts in the field suggest otherwise and science also declines to support the “published opinion”, this narrative starts to vacillate and new scapegoats are then tried out.

and cultural element with deep roots in the region's history.

Forests in Portugal - a manmade landscape

The historical process of turning around the millennia-old tendency for deforestation in Portugal, which started in the late 19th century and was consolidated over the course of the 20th century, in particular from the 1960s onwards ("forestry transition"), is a phenomenon widely studied by a series of researchers in the field of agro-forestry. This brought expansion of the forested area, driven by public forestation policies, demographic and technological chances, and the growing economic and environmental value of certain forest products, such as wood. The scientific literature tells us that this transition was sustained by local and informal arrangements for forestry management, but these were left vulnerable by the rural exodus, the continuous fragmentation of the land ownership structure (exacerbated by inheritance rules, under which smallholdings were divided in each generation and joint management was problematic) and the intensification of wildfires. From the 1970s onwards, growth in the burnt area started to undermine the gains from the transition, demanding new approaches to risk governance and active countryside management.
In Portugal, an idealised vision still persists of the forest as an untouched wilderness, where any human intervention is regarded with suspicion. However, active forest management is absolutely essential to ensure resilience to fire, pests, diseases and other threats - which climate scenarios have aggravated.
Historically, most of the current tracts of forest in Portugal date back to



Area of burnt woodlands in Penela da Beira, Penedono. The fire started on 9 August 2025, in Trancoso, moved across several municipalities and ran through these chestnut woodlands on 14 August. A total of 500 hectares burnt in this civil parish.

forestation programmes launched in the late nineteenth century and intensified over the twentieth century, in the context of the "forestry transition" I alluded to above.
According to the National Forest Inventory, only approximately 0.7% of the country's woodlands are natural forests. The laurissilva in the Azores and Madeira, some of the oak and chestnut woodlands in Peneda-Gerês, and some scattered clusters of native vegetation are examples of these habitats. Even the montado (cork oak savannas), often seen as emblematic of Portugal's rural landscape, is an agro-silvo-pastoral system created by man, resulting from historical transformation of the Mediterranean landscape. This reality underlines the need for planning and continuous intervention to ensure the health and safety of Portugal's forests and the communities who live around them and depend on them for their livelihood.

Returning to the present day

The latest figures confirm that human intervention is crucial in bringing about fire. There is a clear correlation: less human ignitions result in a smaller burnt area. The figures from campaigns aimed at prevention, surveillance and changing people's behaviour are revealing, reflecting a measurable direct impact on reduction of the burnt area.
However, this correlation does not make the phenomenon any less complex. Not all ignitions are human in origin: in 2024, for instance, 42% of fires for which the cause is known were due to arson, 42 to misuse of fire (negligence), but 16% were accidental and 2% due to natural or undetermined causes. The climate and the accumulation of fuel count for a lot, as we have already seen: half a dozen days of extreme drought, strong winds and an accumulation of high inflammable vegetation were enough for the burnt area in 2024 to be four times than in 2023. This leads us to two conclusion: reducing human ignitions effective reduces the risk and size of fires, but completely eliminating all human ignitions does not eliminate all fires.
The effective strategy also has to be twofold: minimise human ignitions and, at the same, manage the territory and the fuels,. prepare rapid and adaptative responses to the fires which, due to accidental, natural or environmental causes, will continue to occur.

Criminalisation

When we talk about fires started by individuals (deliberately, i.e. arson, or through negligence), which appear to account for most ignitions, criminal law rightly comes into play. This is an important issue not just because of the alarm it causes in society, but also because of the need for an in-depth legal debate. In other words, in addition to the difficulties faced by the State in applying the existing rules, there is another unavoidable dimension: the question of criminal justice. How does the current legislation treat the causers of wildfires? Does the Portuguese Criminal Code make sufficient distinction between the definition and punishment for arson, i.e. fires started intentionally, and negligence, i.e. fires started by carelessness or omission.
The Criminal Code lays down that someone who starts a forest fire is subject to a prison sentence of one to eight years. If, through this conduct, the perpetrator creates a danger to the life or physical integrity of another, destroys property of a high value, leaves the victim in a situation of hardship or acts with the intention of obtaining economic benefit, the penalty is aggravated to three to twelve years. If the fire is caused by negligence, the perpetrator is punished by a prison sentence of up to three years or a fine, which can be increased to up to five years in prison in the case of gross negligence. The code also establishes a prison sentence of one to five years for anyone hindering suppression of a fire.
So, although a distinction is drawn between arson and negligence, there are doubts as to the proportionality and efficacy of the penalties. There are those who argue that, in extreme cases, the crime of arson should be combined with that of qualified homicide, when the perpetrator consciously accepts the risk of causing death.
Although the legal framework is established, there are barriers to its application: difficulties of producing evidence, repeated offences and the public perception of impunity.
Specialists underline the importance of distinguishing between imprudence and criminal intent, ensuring that the criminal response is proportional and effective and serves as a deterrent.
In this context, there is a growing consensus among legal experts that the criminal framework is in need of review, so as to strengthen the procedures for investigation, to attach value to prevention and effectively hold offenders to account.
Penalties must be firm, but balanced, ensuring protection for fundamental legal goods, such as life, physical integrity, property and ecosystems, without neglecting the principles of justice and proportionality.

Combat (and prevention)

Despite the tireless efforts and courage of fire fighters, who continue to be essential to protecting the population, we urgently need to recognise the fighting wildfires requires a more specialised approach, and above all an approach more centred on prevention.
Urban fire brigades, often comprising volunteers, are not prepared to work in complex and unknown forest terrain, which represents a risk to their safety and limits the effectiveness of their response.
The size and frequency of fires in Portugal demands more than stepping up fire-fighting: in requires shifting the paradigm to prevention. An effective

In Portugal, an idealised vision still persists of the forest as an untouched wilderness, where any human intervention is regarded with suspicion. However, active forest management is absolutely essential to ensure resilience to fire, pests, diseases and other threats.

The size and frequency of fires in Portugal demands more than stepping up fire-fighting: in requires shifting the paradigm to prevention.

response entails a national professional body of forest fires-fighters, permanently manned, with teams working through the winter on managing the territory, familiarising themselves directly with the physical environment, clearing fuel from the undergrowth and creating containment areas. In other words, there is a need for active and continuous prevention, able to anticipate risks and reduce vulnerability in the countryside.
In order to address this structural reality, Portugal should set up a high specialised national fire-fighting force, dedicated exclusively to management and prevention of wildfires, like that existing in other countries for recurrent natural risks. Just as Japan has specialist earthquake and tsunami teams, the Netherlands has teams for floods, the United States for hurricanes and forest fires, and Chile for earthquakes and volcanic eruptions, Portugal should have a permanent, multidisciplinary force, tailored to our own reality.
This force should not be limited to direct fire-fighting and operational prevention. Just as disaster management agencies in other countries work on planning, public education and recovery, in Portugal this organisation should also engage in territorial management, risk communication, community education and coordination with local authorities and organisations. Its mission should be continuous and not seasonal, geared to reducing vulnerability in the territory and increasing resilience in communities.

Clear line of command, effective coordination

Decentralisation of command and more effective coordination between authorities are recognised as crucial factors for addressing wildfires in Portugal. Experts stress that it is fundamental to ensure a clear and flexible chain of command, able to coordinate the different forces involved - fire brigades, forest fire-fighters, civil protection, local authorities and forest management bodies.
Experience in recent years has shown that over-centralisation could get in the way of a rapid response, tailored to local conditions, whilst intelligent decentralisation enables commanders more familiar with the terrain to take decisions tailored the specific needs of each region. At the same time, robust institutional coordination is essential in order to avoid duplicating efforts, ensuring efficient use of resources and promoting an integrated strategic vision, especially in more complex climate emergency situations.
In this context, the Portuguese League of Firemen has publicly called for action to strengthen fire brigades, but also acknowledges that the current model needs to be rethought, proposing greater operational autonomy for responding to climate emergency challenges more effectively and more safely. This position reflects the concern that the existing, over-centralised model can limit the local response capability and hinder adaptation to the specific features of the territory. The public debate has produced a consensus that only with strong expert leadership, respect for local knowledge and effective coordination between all actors will it be possible to protect communities and respond adequately to the challenges posed by wildfires.

Fire storylines: the role of the media in covering fire

During the summer months, forest fires are turned into a spectacle that takes pride of place in TV and online news. Our screens fill with images of flames consuming hectares of scrubland, farmland and forest, planes and helicopters in operation and people fleeing with despair stamped on their faces, as they see their houses, villages and lives succumb to the blaze. Everything is calculated to grab your attention: the burnt area, the number of houses affected, whether sufficient resources (aerial, primarily) are available and how many fire-fighters have been mobilised The images are repeated on every channel, for hours, creating a scenario of permanent calamity, a spectacle of terror designed to keep you watching, but not to explain.
The formulaic nature of the coverage prevents it from investigating more deeply. Endless opinions are sought and expressed, but the TV channels rarely present a detailed debate on land use planning, prevention plans, surveillance routes or preventive forestry programmes.
Outside the critical season, the technical debate is non-existent. There are no regular programmes featuring climatologists, ecologists, forestry officers, politicians and local councillors or representatives of rural communities, discussing what can be done in the winter and spring to prepare agro-forestry land, clearance and management of fine fuel in scrubland and forests, restoration of burnt areas, the need for planning in urban-rural interfaces, reforestation plans and creating more corridors that combine farmland, scrubland and forest.
The absence of any such technical and educational debate creates fertile ground for disinformation. Repeated sensationalist headlines and dramatic footage do nothing to single out and elucidate causes and consequences.



Left, actively managed forest; right, unmanaged area. The difference in organisation of the territory is visible in the structure of the vegetation and control of the fuel.

Misconceptions and half-truths abound, without the media helping to clarify or rebut these ideas, leaving viewers at the mercy of myths (when not actually engaged in myth making), fear and a culture of blame.
It is difficult to ignore the role of the "arsonists" and "pyromaniacs" in the headlines. The words are bandied about and are in fact relevant when it comes to identifying and punishing criminality. But the exclusive focus on this one dimension serves to simplify a complex reality: we know arson exists, but we are no closer to explaining it. Criminal liability is important, but it is presented as if it were the whole story, which distracts us from the structural factors - the rural exodus, everyday negligence, shortcomings in forest management, unbroken tracts of fuel in the landscape and the contribution of weather factors and climate variability.
There is also the risk of the copycat effect. Repeated exposure to acts of fire, mass mobilisation of fire brigades and individuals accused of arson can trigger this effect among more vulnerable segments of the television audience: when the actions of pyromaniacs constantly fill the news bulletins, they can be imitated by people hoping for their own moment of fame and unable to distinguish between fiction and collective responsibility.
There is also a lack of environmental literacy in TV broadcasts and the media in general. The technical language - "fuel load", "decomposition of forest litter", "vertical breaks between surface and crown", "impact of global warming" - is rarely explained to the public. The institution most closely involved in fire-fighting - AGIF - devotes pages to technical execution, resources and the number of aerial resources, but very little to public communication and participation by the media as partners in

Although far from offering a quick fix, technology can make a very useful contribution, which could change how we address prevention and attack wildfires.

prevention, or to civic training in relation to hazards.
The structural factors - the weakening of rural society, failure to invest in prevention, the fragile economy of interior regions., the cumulative effects of abandonment after multiple low-intensity fires over the decades, climate variability and longer and drier summers - should not be omitted from the news reports.

The media as partners in prevention

Beyond their obsession with "arsonists" and fire-fighting resources, TV channels and other media outlets could play a transformative role: not just by broadcasting tragic images, but by disseminating knowledge and stimulating debate. Detailed debates with a range of voices (scientists, forest managers, sociologists, representatives of local associations), special features outside the fire seasons, information on what people can do to prevent fires, and on the content of planning laws, as well as programmes promoting environmental literacy - all this can help equip the general public to make a contribution.
Media coverage can still include the dramatic images and human interest stories. The flames and the distress of local people can share the air time with calm analysis of the reasons for the fire, and efforts to build a shared vision for the future of the countryside and collective accountability for its defence. Television - and the media in general - can play a civic role all year long, so that fire is not just an issue in the summer and transforming alarm into knowledge, sorrow into action and spectacle into shared responsibility.

Technology

Although far from offering a quick fix, technology can make a very useful contribution, which could change how we address prevention and attack wildfires. It starts with forestry practices better adapted to the fire risk, and producing clones and selecting plants which are more resistant. But it goes far beyond this.
For undergrowth clearance and land preparation, there are now autonomous machines able to operate in complex terrain with needing an operator nearby. Unmanned tractors and vehicles with cutting systems and integrated shredders - real "forest robots" - can move through dense woodlands, cutting down the undergrowth, creating protection strips and spreading shredded organic matter or fire retardants. Fitted with GPS, LiDAR sensors, stereoscopic cameras and humidity sensors, these devices reassess their route autonomously in line with the relief of the density of the scrub.
In northern Europe, prototypes are being tested for autonomous felling: in the US and central Europe, established companies and logging robot startups have developed equipment that clear the forest floor. In other Mediterranean countries, robotised hoes and smart tractors connected to IoT networks are being piloted, gathering real-time data on the state of the vegetation and feeding fire risk prediction models. These technologies complement the work of forest fire brigades, permitting intervention outside the critical season, in hard-to-access areas, with greater speed and accuracy.
In surveillance, technology is transforming traditional watchtowers into intelligent and autonomous systems. Towers equipped with thermal imaging cameras, smoke sensors and microphones, powered by solar energy and connected to mobile or satellite networks, continuously analyse the territory with AI algorithms which detect subtle changes in colour, heat or smoke. Various satellite technologies provide images almost in real time, processed by image analysis and deep learning software to identify hotspots and extremely dry areas.
Long range drones, already used in the US, Australia and Europe, overfly risk areas with multispectral and thermal imaging cameras, mapping the terrain and construction three-dimensional models of plant fuel.
Networks of sensors in the crowns of trees - already used in Japan, South Korea and Israel - communicate with each other and send data via satellite to decision-making centres.
Examples such as the European Copernicus EMS programme, the S4Fire project, and commercial systems such as FireWatch or SmokeDancer in Europe and the US; show how the combination of sensors, drones, satellites and AI can provide continuous, accurate and reactive surveillance. These practices, combined with community engagement policies and apps, demonstrate that technology achieves its full potential when integrated into a territory-wide and participative strategy.
Improvements in short term weather forecasting models, with improved spatial and temporal resolution, are also essential for supporting fire risk management. The ability to forecast in greater detail phenomena such as strong wind, low humidity or extreme heat enables rapid adjustments to be made to surveillance operations, undergrowth clearance and the positioning of fire-fighting resources. Systems are evolving to provide more accurate and frequent data, integrating themselves with sensors in the field and decision-making platforms. This technical information is increasingly crucial for anticipating risk windows and optimising the operational response.
Expertise applied to forestry sciences - from fire ecology to modelling of fuel behaviour - is the foundation than enables data to be transformed into effective decisions and technology into practical solutions.
This is an area in which Portugal should be ambitious. As in other geographical regions and sectors, the use of public funds to support expertise, investment in R&D and the financing of this type of project in the forestry sector will bring cutting edge tech developments which will benefit not just forests, but also other areas, such as precision agriculture and others not even related to the primary sector. The main root cause Despite the correlation between forests and the wealth of a nation, the Portuguese media focuses mainly on the downsides and hazards - fires, abandoned land, exotic (non-invasive) species and invasive

The fragmented ownership structure of rural land and forest is probably the main barrier to effective management of the countryside and prevention of fires.

(and exotic) species - and overlooks the benefits that well-managed forests can bring. This lopsided view forgets there are people who derive their livelihood from forests, who work in them and believe in them. By undervaluing both the know-how of producers and forestry officers and the products harvested from forests, they put off people unfamiliar with the territory and deter a whole generation of young people from studying subjects like forestry sciences and engineering (where full employment is guaranteed). If forests are presented to the public as a problem, what future can there be for those who choose a career in forest management?
What is more, any solution that ignores the returns for local people and excludes the species that contribute most to their income (with eucalyptus the uncontested champion) is unlikely to be fair or effective. In many inland regions, industrial forestry is one of the few viable and structurally important economic sectors. To undervalue its contribution is to forget that, in regions where there is little else, the forest offers a decent livelihood to people who continue to live in rural areas that have long been abandoned. Promoting safer and more resilient landscapes therefore requires that sustainable solutions be established, conciliating ecology with economic viability and territorial justice.

Smallholdings: the structural stumbling block

The fragmented ownership structure of rural land and forest is probably the main barrier to effective management of the countryside and prevention of fires. Inheritance law has meant that plots are divided between the heirs in each generation, especially north of the Tagus, resulting in scattered smallholdings. This prevents economies of scale, undermines the returns from cultivation and leads

Experiments such as land associations in Galicia and other Iberian regions point to how disorganised areas can be transformed into productive and resilient mosaics.

to the land being abandoned. The lack of manpower, the loss of traditional skills, the lack of motivation, physical and financial capacity to clear land of undergrowth, are other factors that also lead to land being abandoned, which in turn causes fine fuel to accumulate, and the fire risk to spiral out of control. This creates a vicious circle in which land burns, causing even more to be abandoned, and without active management it will only burn again. Despite being a strategic national assets, forests are faced with structural constraints - the lack of scale and coordination between owners, the difficulty of paying taxes or negotiating intervention work, the lack of interest of absentee landowners or others who no longer feel a connection to the place from where their family originated, just a few generations ago. In addition, the incentives have perverse effects: instead of rewarding those who care for their land and make it less fire-prone, they penalise those who fail to do so, almost always without seeking to understand whether they have the physical or financial capacity to do the work, creating a burden that further encourages abandonment, non-registration and widespread vulnerability. Recognising this problem demands solutions on a larger scale and territorial integration. The State can intervene by combining properties, simplifying legal rules, offering tax breaks and financial incentives for those who combine plots and supporting uncomplicated schemes for joint management. Long-term agreements with recognised management bodies, tax rules that encourage owners to combine their smallholdings and support for private investors in order to create larger property units are all ways of making forestry activities more viable. Rural or forestry co-ownership schemes - where absentee or uninterested landowners hand over management of their plots to public or private bodies in return for a market rent and and consequently relieved of the obligation to care for the land, significantly reducing the fire risk - are another effective way forward. Owners give up their plots in exchange for rights or shares in a larger property. Schemes such as “land banks” enable land to be made over temporarily to professional operators, releasing owners from their legal and operational obligations.

Experiments such as land associations in Galicia and other Iberian regions - where smallholdings are managed collectively, with wood placed on the market or outsourced management, and continued common ownership - point to how disorganised areas can be transformed into productive and resilient mosaics.

Stopping the risk in its tracks

There is also a need to review land use planning: buffer zones are needed around urbanised areas and new houses should not be built in forested areas outside villages, because they constrain fire-fighting and result in much higher prevention costs. Ecological corridors are needed which can compartmentalise the risk, invasive species (such as acacias) need to be replaced by stands of native or productive species, and agro-forestry-pastoral mosaics are needed with strips of less combustible matter. It is also necessary to halt the construction of countless “industrial estates” in municipalities up and down the country, many with little or no industry worthy of the name. Set up outside the more urbanised areas, they are surrounded or neighboured by forests, and a few years after the much vaunted opening ceremony, they end up being swallowed up by rural land on one side and urban expansion on the other, creating an unacceptable continuum of risk.

Isolating the risk is not a standalone solution - a mosaic of alternating species has been shown, year after year, not to eliminate major fires if not accompanied by active management, fire breaks and cleared tracks, fuel management strips and riverside gallery forests. Practical experience has shown that even relatively large tracts of forests, provided consist of well managed eucalyptus plantations - with stands of different ages, regular thinning, riverside gallery forests with native species and fire breaks which are properly cared for - can do even more to contain the flames, provided they are managed and work is carried out at the right times, under competent technical supervision. Indeed, our practical experience has shown that, in several part of the country, the limitations imposed by the authorities on intervention and mechanised undergrowth clearances in these riverside gallery forests ends up turning them into fuses that then extinguish themselves in the well-managed eucalyptus stands alongside them - making them part of the solution and not of the problem.

More people, more value, and more management

The root of the problem is not just structural: there are also social and economic dimensions. It is essential to encourage people to stay in smaller cities and in the countryside, with incentives for economic development and private enterprise, creating jobs, housing, and public services, to form communities able to take part in the surveillance and management of the territory. Another way forward is to add economic value to the forest, by paying not just for its wood products and other tangible goods, but also for the ecosystem services it provides - such as carbon sequestration, soil formation, water regulation, and biodiversity. Arrangements whereby payment is made for environmental services are therefore fundamental for integrating forests in the green economy and making sustainable forestry management attractive to landowners. In short, combating the causes of fires requires actions on several fronts: correcting structural stumbling blocks (fragmentation, the lack of scale, abandonment, incentives with perverse effects), reformulating land use planning (buffer zones, corridors, substitution of invasive species) and adopting innovative management models (larger property units, co-ownership schemes and land banks), learning from international experience and instituting a strategy for territorial scale and integration. Only with professionally managed forests, with adequate scale and a collective vision - uniting instead of dividing, aligning public and private interests - will it be possible to restore the economic and ecological viability of interior regions of the country and effectively combat the wildfires.

The key take-away

Despite the blame that certain ideologically inspired groups persist in placing on it, eucalyptus is not responsible for forest fires. It is true that it has certain characteristics that can make it fire-prone - such as its loose bark which, in certain weather conditions can ignite secondary fires several hundreds of metres away or even at a distance of 2 to 3 kilometres. But this is not an exclusive feature of this species: conifer forests can produce similar projections. More relevant than the range is the density of ignitions at a short distance, which in extreme conditions enable the fire to

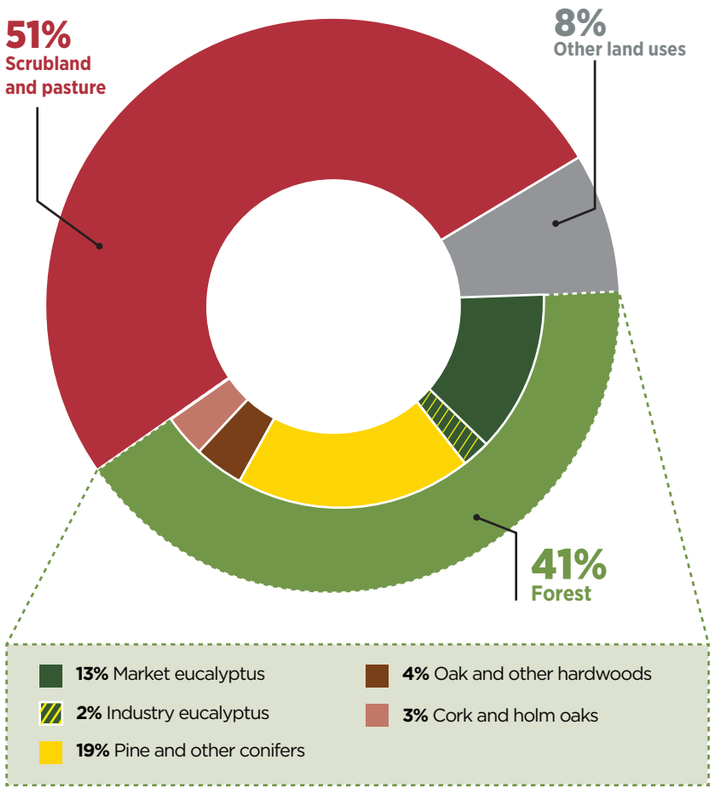


Arouca, September 2024. There was no opportunity for fighting the fire, but in a managed area, from which fine fuel had been removed, the fire was contained without damage.

Only with professionally managed forests, with adequate scale and a collective vision will it be possible to restore the economic and ecological viability of interior regions of the country and effectively combat the wildfires.

advance by leaping from one head to another - a phenomenon that also depends more on the weather and the landscape structure than on the species itself.
It is also important to deconstruct the myth of volatile eucalyptus oils: although these exist, they are a feature shared with many other species, including native trees, and have almost zero effect on fire propagation, as they are absent from the litter layer, which is the main fuel for fires.
But there are other factors, just as if not more important, which argue in favour of eucalyptus but are seldom remembered. The Eucalyptus globulus species - the most common in Portugal - has a crown which is relatively not very dense, grows rapidly in height and presents a large vertical gap between the forest floor and the crown. The leaves are thick and covered in a waxy cuticle, which makes them more resistant to combustion. This means that fire propagation through the crowns is less common than in other species, and fires in eucalyptus forests tend to be less severe than those in other types of forest, even in years with extreme meteorological conditions.
Even with crowns relatively less dense than other species, because they grow quickly and because good forestry practices recommend that they be planted with close spacing, they form a closed canopy after a few years, substantially reducing the sunlight and creating shade in the undergrowth, which reduces the accumulation of scrubs and shrubs. In well-managed forests, this control of fine fuel is a normal practice as from planting, with the intensity and frequency of clearance works determined by the productivity of the trees locally, whilst the land is fertilised on plantain and in subsequent years until the closed canopy is formed - after around four years.
There is plenty of technical and scientific literature, much of it produced by academics and researchers of global standing, which shows that there is no correlation between the presence of eucalyptus and the risk or severity of fires in Portugal, and that forest management and the meteorological conditions are the truly decisive factors for the behaviour of fire, irrespective of the predominant species.
Indeed, research shows that fire risk variability is greater within the same species than between different species, underlining that it is forest management, and not the species in itself, that really makes a difference.
Statistical analysis of burnt areas over the past 20 and 30 years shows fairly consistent patterns. The land use classes that most contribute to the burnt area are scrubland and pasture, accounting for the same proportion over both periods: on average, 51% of the annual burnt area. Eucalyptus stands correspond to 17% and 15% over the same periods, but these aggregate figures conceal two distinct realities which are important to understanding the phenomenon: on the one hand, managed eucalyptus forests account on average for only 2% of the annual burnt area, and unmanaged eucalyptus forests represent a much higher proportion, in the order of 13 to 15%.
The territorial distribution of eucalyptus stands is also not homogeneous. It is shaped to a large extent by soil and climate factors and also proximity to centres of consumption, as the logistical costs of forest operations tend to be of the same order of magnitude as the value of unfelled timber. This means that eucalyptus stands are mostly concentrated near the coast and north of the Tagus. Coincidentally, it is also north of the Tagus that ignitions are most frequent.
This means that the presence of eucalyptus in zones with a larger burnt area reflects above all the conditions of landscape, climate and pressure from the number of ignitions, and not a direct causal relationship between the species and fire.

Distribution of burnt area
(average 1996-2025)



Sources: ICNF (data from 1996 to 2024) and EFFIS (2025)

Acting with expertise to protect the future

In short, the intensity of fire and the speed with which it spreads do not depend so much on the species present, but rather on the accumulation of fuel, the topographical characteristics and the atmospheric conditions, such as wind speed, temperature and relative humidity. The over-simplified public debate, which directly connects eucalyptus to the fire risk, ignores this complexity and disregards the fundamental role of forest management and organisation of the territory.
The debate about the role of eucalyptus in fires should therefore be more technical and less emotional.
It was this sense of responsibility and hope that informed this edition of My Planet, in which we have sought to present our readers with insights and viewpoints which all need to be considered. It now remains for us all to get down to work: planning, managing, assessing and correcting - the only way for protect our countryside and the future of generations to come.

This article reflects the author's individual opinion, and was written without prior knowledge of the contributions from more than 40 specialists who took part in this edition. It is accordingly not intended as a summary, or even as a reply to those contributions



Fires are changing. Longer, fiercer, and harder to predict, they are forcing a rethink of man's relationship with the land.

We talked to forty researchers, experts, and professionals in the sector, who share their insights and distinctive contributions to a problem that calls for collective action.

BECAUSE TODAY'S FIRES DEMAND RESPONSES DIFFERENT FROM THOSE OF THE PAST.