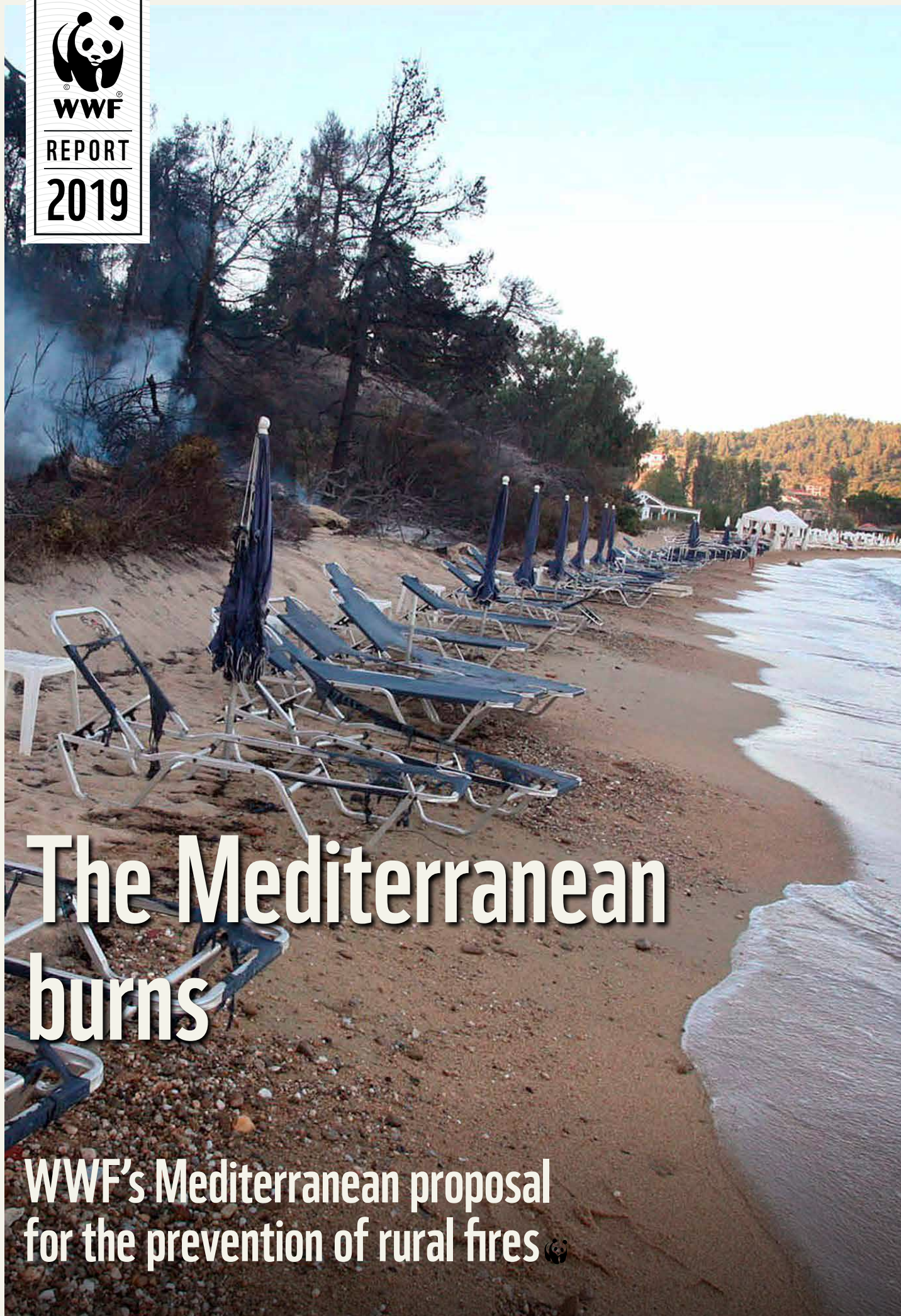




WWF

REPORT

2019



# The Mediterranean burns

WWF's Mediterranean proposal  
for the prevention of rural fires 🐼

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# SUMMARY

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Most countries in the Mediterranean basin are facing the same emergency regarding rural fires. Their forest lands are burning out year after year through small fires, but ever more frequent the conditions are perfect for fire crises difficult to keep under control, resulting in major environmental and economic damages and severe risks for human life.

The most recent ‘megafires’ have shown how the landscape, forests, current firefighting systems and society as a whole, are not prepared for these fires exacerbated by climate change and socio-economic changes, as land use changes, urbanization or increase of forest flammability.

In this report, WWF analyzes what is happening in the north Mediterranean region that causes it to burn in increasingly dangerous waves and potential solutions. The only effective strategy to face these fires includes facing the causes and designing a real prevention system: reducing the high incident rate and making the territory less flammable and more resilient to climate change. Urgent action is needed to prepare for the following episode that will take place sooner or later.

Most of north Mediterranean countries share the same challenge: tackling the virulence of rural fires, increasingly frequent, exacerbated by climate change. That is why, for the first time, this report on rural fires, coordinated by WWF Spain in cooperation with the national offices of WWF in France, Greece, Italy, Portugal and Turkey, analyses the situation of each country at the north Mediterranean, offering cross-border proposals, shared and adjusted to solve this terrible joint environmental and economic problem.

# FIRES IN THE MEDITERRANEAN REGION

## A GROWING HAZARD

**Mediterranean countries especially affected by forest fires (Portugal, Spain, Mediterranean France, Italy, Greece and Turkey)**



Forests cover over 76 million hectares in north Mediterranean basin, more than 45% of total regional area. In some countries as France, Spain, Greece or Portugal, forests represent at least the half of the total land area. According to WWF estimates, only 17% of the original forest cover of the Mediterranean area still remains. In spite of the decreasing trend in the number of fires and burned lands since the 80's, in recent years, notwithstanding the modern firefighting systems, the risk of super-fire waves with an explosive behaviour has been increasing in most countries.

In June 2017, for the first time in our latitudes, Portugal suffered a new type of fire, unknown to this date by the scientific community: a sixth-generation mega fire clearly linked to global change. Extreme, uncontrollable and lethal. A type of fire that was repeated again that same year in Portugal and Spain, and a year later in Greece. Climate change is accelerating and intensifying the occurrence of large fires at a quicker step than originally expected: we have moved from not having this type of fires to having the three largest fires in Europe in merely two years, and in the same region.

Fire has always been a natural element of forest ecology and a main shaper of the Mediterranean landscape, but in recent years, it has become a serious hazard for rural

<sup>1</sup> The increasing on environmental and socioeconomic fire impacts, in which more often the burned area is higher than the forest area affected, has made that some of the countries refer to rural fire. In this report we use both for the same phenomenon.

<sup>2</sup> Throughout the report, references to France relate to the Mediterranean area of the country.

areas, forests and people. How can this be? Why if firefighting systems are becoming more powerful and effective, fires are increasingly dangerous in the south of Europe?

This owes to the highly flammable landscape because a parallel process of homogenization of forest landscapes (abandonment of rural areas and traditional forest uses and thus a growing young forests and shrub land area) and increased “urban” uses of rural space (recreation, transport, vacation, suburbanization), that results to increased fire incidence, severity and civil risk. Combined with a rooted “fire culture”, in which people use fire as an agrarian management tool or for recreation, and the cumulative effects of global warming, circumstances for true firestorms are created.

Between 2009 and 2018, the Northern Mediterranean has an average of more than 56,000 fire incidents, burning more than 375,000 hectares. Roughly 0.6% of the region’s total forest area is burnt each year. Since 2000, fires incidents have been especially critical for some countries in southern Europe.

**Table 1. Dark years recorded in the Mediterranean region since 2000**

<b>Critical Years</b>	<b>Countries affected</b>	<b>Area burned</b>
2003	Southeast France and Corsica and Portugal	Flames left more than 60,000 hectares burnt, a record figure, compared to an average of about 8,000 hectares per year today. In one of the disasters in the Côte d’Azur, 10,000 persons were evacuated and 5 lost their life. In 2003, Portugal was affected by one of the largest heat waves ever: 18 people died, with the central region being most affected by the fires, in a total of 425,839 ha. A quarter of the forest area of Pinhal de Leiria burned. The Government declared at the beginning of August 2003 the state of public calamity.
2005	Spain and Portugal	189,000 hectares burned in Spain, 80% more than the yearly average. In Portugal, 340,000 hectares burned, twice the usual yearly average.
2007	Greece and Italy	Italy had 228,000 hectares burned, 200% more than the normal yearly average. Nearly 70% of the fires were intentional. 262,000 hectares were affected in Greece, 300% more than usual. 78 persons died and more than 1,500 houses burned and the infrastructures of a whole region were severely damaged.
2008	Turkey	Several waves of fires left about 30,000 hectares affected, the largest of the last two decades.
2012	Spain and Italy	In Italy, about 130,000 hectares burned, 80% more than a normal year. 35%, in Sicily. In Spain, the burnt area was nearly 220, 000 hectares, twice the normal figure.
2017	Spain and Portugal	In Portugal, 540,000 hectares were destroyed by fires, 250% more than the average burned each year. In Spain, 180,000 hectares burned, 70% more than a normal year. Additionally, 119 persons died in Portugal and 4 in Spain.
2018	Greece and north and central Europe	The total area burnt in Greece was quite lower than average, but the combination of abundant dry vegetation, strong winds and a high population density ended up in Greece’s deadliest fire, with 102 victims. For the first time in recent history a troubling incidence of forest fires was also recorded in Central and Norther Europe.

Most concerning is the fact that this phenomenon does not only affect southern Europe: July 2018 fires now show that northern and central Europe are also on the path of new fires due to climate change. The unusually dry summers in these regions have recently caused large fires in countries like Sweden, Germany, Poland or the United Kingdom, historically not used to such forest fires.

The European Forest Fire Information System (EFFIS) recorded up to May 2019, eleven times more disasters than usual for this time of year, with a result of 40% increase of the area burnt, more than during the whole of 2018.

We must urgently accept that we have a problem: we have to learn to live with fires, but we must be better prepared to those which are reaching an extent in size and severity. One problem that calls for cross-border, shared and adapted solutions.

### The impact of fires in southern Europe

**Environmental losses.** Rural fires affect an average of 500,000 hectares per year in Europe, of which 375,000 hectares pertain to Mediterranean countries<sup>3</sup>. However, every few years, the burnt area grows in this region: every five years it grows to about 700,000 hectares. In 2017, only in the Mediterranean region, nearly 900,000 hectares burned, equivalent to the total area of Cyprus, and the highest figure recorded since 1985. These forest areas burnt each year threaten the exceptional biodiversity of the Mediterranean to an extent that should be evaluated in detail: protected areas burned, habitat of interest destruction, species of interest affected (as Herman turtle or cork oak and associated fauna), volume of CO<sub>2</sub> released to the atmosphere, impacts on hydrological balances and water quality or irreparable losses of fertile land.

**Human losses.** Between 2000 and 2016, 488 firefighters and civilians lost their lives in Europe, about 30 persons per year. Only in 2017 and 2018, 225 persons died among in Portugal, Greece and Spain. The new fires have proven to be very lethal, even though countries are aware of the hazardous conditions and have powerful firefighting mechanisms.

**Economic losses.** Currently, fires represent losses of about 3 billion euros per year, for the whole continent. It is estimated that for 2070-2100, in a scenario of increasing greenhouse gases emissions, the economic impact of fires in Greece, Spain, France, Italy and Portugal may reach 5 billion euros per year.

*Source: EFFIS, EC PESETA II project report, Analysis of forest fire fatalities in Southern Europe.*

<sup>3</sup> This figure includes the European Mediterranean countries (Spain, France, Greece, Italy and Portugal) and Turkey.

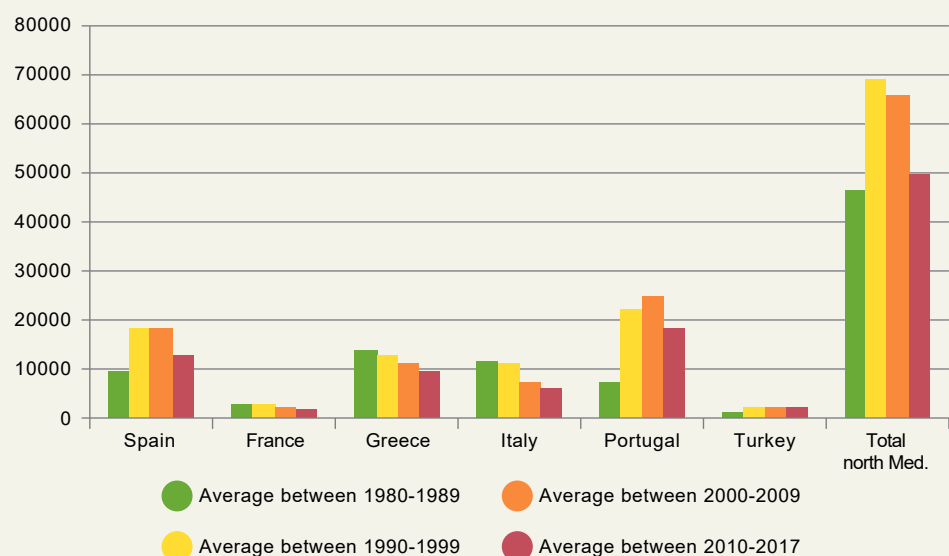
# FIGURES FOR THE MEDITERRANEAN REGION

## FOREST FIRE TRENDS<sup>4</sup>

**Less number of fires.** The increase in citizen awareness, the lower number of people in the forest due to abandonment and greater prosecution of fire crime have lowered the number of fire incidents in all Mediterranean countries. The average fire disasters in the region decreased by 22% compared to the 90's decade, between 2010 and 2017.

However, the average of more than 56,000 fires per year between 2009 and 2010 is still an exorbitant figure. Considering that between 90 and 99% of the fires in the Mediterranean region are due to human causes, governments must aim at a more forceful reduction. For this, efforts to determine the causes and motivations must be increased, whether the act was negligent or intentional.

**Chart 1. Trends in the number of fires, per decade and country**

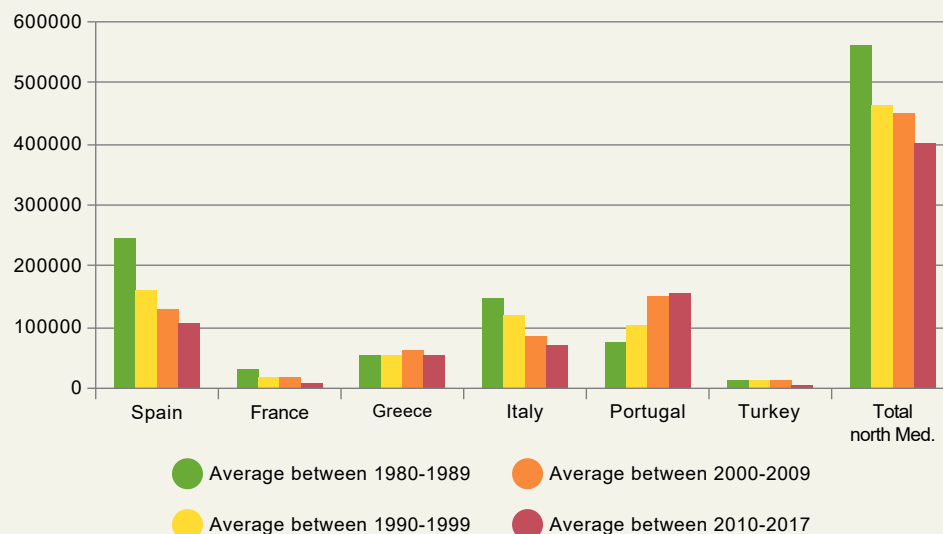


*Source: Forest Fires. Sparking firesmart policies in the EU. European Commission, 2018 and official data published by the Directorate of Forestry in Turkey.*

**Less burnt areas.** The total area affected by the fires has also decreased in the last few years in almost all Mediterranean countries due to a general increase in the effectiveness of firefighting mechanisms and the reduction of the total number of incidents. The exception is Portugal, where the burnt area has not ceased to grow in the last years.

On average for the entire region, between 2010 and 2017, the area affected by fire has decreased by 22% with respect to the decade of the 90's. However, the impact is still high: an average of more than 375,000 hectares burned.

<sup>4</sup> The analysis of the trends for forest fires used the official statistical series of the Mediterranean countries analyzed in this report and the European Forest Fire Information System (EFFIS) <http://effis.jrc.ec.europa.eu/>. It shows the yearly average of fires recorded in Spain, Greece, Italy, Portugal and Turkey and the Mediterranean area of France.

**Chart 2. Trends in the total area affected (ha) per decade and country**

Source: Forest Fires. Sparking firesmart policies in the EU. European Commission, 2018 and official data published by the Directorate of Forestry in Turkey.

**More large fires.** Despite the general decreasing trend in the number of fires and burnt areas since the 1980's, the dangerous trend of large forest fires (LFF) continues, those that burn more than 500 hectares. Between 2009 and 2018, these barely represent per year 0.15% of the total fire incidents<sup>5</sup>, but they leave the most dramatic effects, as they burn 35% of the total fire-affected area<sup>6</sup>.

**Table 2. Impact of large fires<sup>7</sup> (LFF) per country between 2009 and 2018**

	Percentage of LFF with regard to the total	Percentage of burnt area in LFFs with regard to total area affected
Spain	0.2	37
France	0.2	47
Greece	0.09	36
Turkey	0.1	22
Average Med	0.15	35

In Portugal, there are no data on fires that burn more than 500 hectares. In this country, fires starting at 100 hectares are considered LFF's. Between 2008 and 2018 fires greater than 100 hectares accounted for 0.66% of the total fires in Portugal and 68% of the total area burned.

Furthermore, a new generation of fires has appeared in Mediterranean Europe. These are megafires that generate true firestorms due to the collapse of the convective column. This phenomenon makes flames spread at speeds above 4,000 hectares per hour (ha/h)<sup>8</sup>. For instance, the fires in Chile in 2017 moved at a rate of 8,000 ha/h and those in Portugal in October 2017 reached a speed of 14,000 ha/h<sup>9</sup>. The rate of occurrence of these fires is very low, but they result in catastrophic damages to the landscape, the country's economy and

<sup>5</sup> These figures refer to the LFF number and the burnt area in LFF in Spain, France, Greece and Turkey. The government of Italy has not provided the data and Portugal has a different classification system.

<sup>6</sup> Same as above.

<sup>7</sup> Fires in which more than 500 hectares burned.

<sup>8</sup> Picos, J.; Castellnou, M.; Salgueiro, A.J. *Cooperación transfronteriza en la prevención y extinción de incendios forestales en el Eixo Atlántico. Cuadernos de Cooperación del Eixo Atlántico. Eixo Atlántico do Noroeste Peninsular*, 2018.

<sup>9</sup> Idem.



the lives of its dwellers. These megafires are almost impossible to control through standard firefighting techniques. Prevention and fire management are the only effective tools.

In the last two years, Portugal, Spain and Greece have experienced severe mega fires that have left 222 deaths, hundreds of injured, thousands of persons evacuated and countless material and environmental damages. The terrible consequences of these fires exacerbated by climate change were clearly bigger because of disorganization of the emergencies systems, the lack of forest management and critical socioeconomic changes. Fires are no longer a forestry or rural problem and have now become civil emergencies.

## FIRES PER COUNTRY: THE SAME PATTERN, BUT NOT THE SAME RISK

Fires in the Mediterranean basin share a similar pattern, but not all the countries run the same risk. The following table shows the number of fires and the area burned per year in each Mediterranean country.

**Table 3. Average number of fires and area affected per year between 2009 and 2018**

	Nº of fires	Area Burnt	% nº of fires per forest area	% forest area of the country burned each year
Spain	12,174	96,406	0.05	0.35
France	1,645	7,032	0.04	0.18
Greece	9,222	50,202	0.14	0.77
Italy	7,855	72,945	0.07	0.66
Portugal	22,693	139,672	0.46	2.84
Turkey	2,397	6,665	0.01	0.03

Source: WWF from the official statistical series of the Mediterranean countries analyzed in this report and the European Forest Fire Information System (EFFIS)<sup>10</sup>.

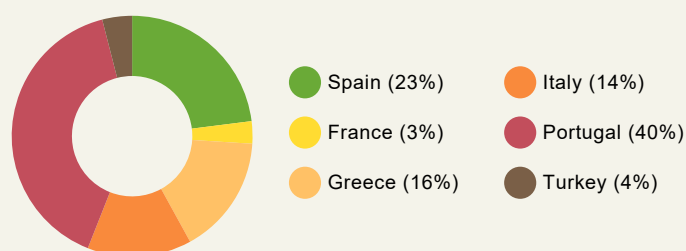
Portugal is by far the Mediterranean country that has suffered the most due to forest fires: in the last 30 years, it has faced more fire incidents with more hectares burned. 35% of the region's fire incidents and 39% of the area affected each year occur in Portugal. An average of 3% of Portugal's forests burn each year.

The analysis of fire disasters, understood as the number of fires per hectare of forest, indicates that, after Portugal, the countries with more fires are Greece, Italy and Spain. As to the percentage of the forest area burned each year, also after Portugal, there is again Greece, with 0.77%, Italy with 0.66% and Spain, with 0.35%. The less affected countries, both regarding the number of fires and burnt areas, are France and Turkey.

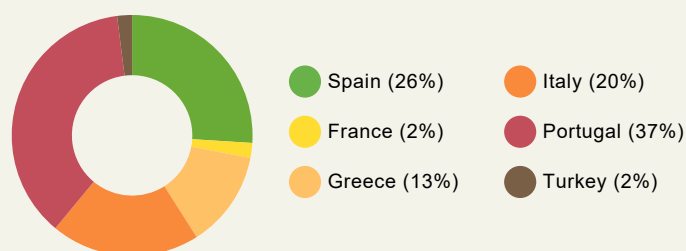
<sup>10</sup> EFFIS: <http://effis.jrc.ec.europa.eu/reports-and-publications/annual-fire-reports/>; Forest fires database for Mediterranean area in France: <http://www.promethee.com/incendies/>; Forest Service and Fire Brigade in Greece: [https://www.fireservice.gr/el\\_GR/synola-dedomenon](https://www.fireservice.gr/el_GR/synola-dedomenon); Instituto da Conservação da Natureza e das Florestas in Portugal: <http://www2.icnf.pt/portal/florestas/dfci/inc/estat-sgif>; Dirección General de Desarrollo Rural, Innovación y Política Forestal in Spain: [https://www.mapa.gob.es/es/desarrollo-rural/estadisticas/Incendios\\_default.aspx](https://www.mapa.gob.es/es/desarrollo-rural/estadisticas/Incendios_default.aspx); Directorate of Forestry in Turkey: <https://www.ogm.gov.tr/lang/en/Pages/Forests/TurkeyForests.aspx>

France and Turkey have some particularities with other northern Mediterranean countries that justify their lower risk at forest fires. In France, the rural abandonment process happened few decades earlier, which means that their forests are becoming older so they are more resilient. In addition, it has developed and coordinated firefighting system. Turkey has a less flammable landscape, because planned forestry operations continue throughout the country and rural abandonment has not been so exacerbated and still maintaining important traditional uses.

**Chart 3. Distribution of the number of fire incidents in the Mediterranean countries between 2009 and 2018**



**Chart 4. Distribution of burnt area in Mediterranean countries between 2009 and 2018**



© EVI KORAKAKI-WWF GRECIA

Chios island (Greece). August 2012

# WHY IS THE MEDITERRANEAN REGION BURNING?

Why are there so many fires in the Mediterranean region, and specifically in some countries? Why are such intense catastrophic episodes more frequent? It is a quite complex problem with lots of variables, and where extremely high incident rates, the growing flammability of the territory and climate conditions that favor the propagation of flames have a main roll.

## HIGH INCIDENT RATES

Fires in the Mediterranean region essentially have a human component: on average, humans are responsible for 96% of fire incidents, whether accidentally, due to negligence<sup>11</sup>, or intentionally. Only 4% of fires are due to natural causes. As seen in the table below, fires due to lightnings occur in very specific areas in the region.

**Table 4. Causes of fires, per country**

	Total fires		Fires due to human causes		
	% fires due to natural causes	% due to human causes	% intentional fires	% fires due to negligence	% fires due to unknown causes
Spain	4	96	55	23	15
France	2	98	21	77	<10
Greece	4	96	19	21	51
Italy	1	99	26	54	19
Portugal	1	99	26	19	54
Turkey	11	89	9	47	31
<b>Average North Med.</b>	<b>4</b>	<b>96</b>	<b>26</b>	<b>40</b>	<b>28</b>

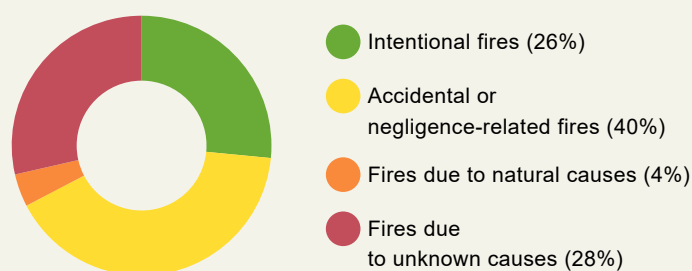
A relevant factor is that, at a Mediterranean level, the information about the causes and reasons for fires is very uncertain. While there is a large variability per country, on average, almost 30% of fire incidents in the region are due to unknown causes. The causes for more than half the fires in Greece and Portugal are unknown. If one does not know why forests burn, one can hardly come up with solutions for social prevention that may manage to reduce this insane number of fires.

Additionally, we have the high percentage of negligence of 40% (rising up to 77% for France), which connects to the rooted fire culture of Mediterranean people: their use fire as an everyday tool of work, for clearing of fields, burning of debris, among others, and recreation (barbeques, camp fires, fire stoves, etc.). The cultural differences in the use of fire and the uneven rate of social conflicts cause the motivations to follow different patterns from one area to the other, calling for a specific analysis for each geographical area.

<sup>11</sup> Refers to fire events caused by carelessness, not by deliberate acts.

Regarding intentionality, while the region's average is 26%, one should not overlook the troubling situation in Spain, where up to 55% of incidents are intentional, which gives an idea of the serious social and economic conflicts that have not been settled for decades. Conflicts with local governments due to administrative barriers, delay in the subsidies payment or with uses limitation in protected areas, conflicts between neighbours or with forest agents, conflicts over the wolf or hunting. In Spain there are many conflicts that are unknown.

**Chart 5. Causes of fires in the Mediterranean region.**



It is urgent to minimize the main causes and motivations of fires, which is only possible by analyzing the social and economic factors that make people start fires, increasing social awareness about the dangers, rewarding good practices and punishing the infringers.

## BURNING TERRITORY

Mediterranean landscapes have an extremely high and increasing flammability. There are four keys for explaining the particularly complex situation of Mediterranean Europe:

**Rural abandonment and depopulation.** The strong depopulation and ageing of the population, especially of the rural areas in the interior and mountains, have forced the abandonment of all traditional agricultural activities. The inefficient rural development policies of the entire region have proven ineffective for settling the population and generating Jobs in the rural area. Thus natural vegetation, shrubland, young pioneer forest stand but also monocultural plantation colonized the landscape. They are increasing landscape combustibility and flammability.

For example, Galicia and the north and centre of Portugal have the worst demographic indexes of the European Atlantic region. In Portugal, in one of the municipalities most affected by the fires in 2017, Pedrógão Grande, the population was reduced by 20% between 2001 and 2016 and for every 100 young people there are 284 elderly.

While rural abandonment also means fewer people are living close to the forests who can start fires, the increasing flammability of these forests override this fact and result in higher intensity of the fires.

Rural abandonment is a reality in most countries in the region, but its history and evolution is somewhat different from country to country. While rural abandonment trends started much earlier in France, followed by Spain, Italy, Portugal and Greece, Turkey started



***The Mediterranean landscape has become a powder barrel. In a few decades, it went from being a mosaic overused of crops and pastures, with few small spots of grazed forests, to becoming a mass of thick understory of shrubs, not diverse pioneer forests stands, and little well structured old canopy, interspersed with constructions and urban developments that increase fire hazards. We need to rethink this landscape and propose solutions for a less flammable landscape.***

experiencing this trend more recently. The forest villages are still populated in Turkey and despite the decreasing intensity, the villagers still continue their traditional farming practices and collect wood from the forest at a considerable rate.

**Agricultural abandonment.** The continued abandonment of traditional land uses is drastically changing the vegetation. The end of herding and the abandonment of crops have contributed to an increase of forest areas and the disappearance of the traditional mosaic landscape: cultivated and herding areas of the past are today covered by shrubs, grass and stands that, without proper management or planning, becoming more flammable for future fires. In some Mediterranean areas, the percentage of agrarian areas abandonment o reach 30%. Although agriculture should maintain some areas, this increase of forest area is not necessarily bad: with effective management and adapted silviculture to reach next stages of the dynamics (older forest and more diverse, among others), would be positive for biodiversity, climate change mitigation, water cycle or people. The main problem is that, in many countries, there is no effective forest management in those growing forests.

**Lack of effective forest management.** The overall lack of profitability of forest exploitations and the absence of a common European Forestry Policy focus to natural hazards prevention and climate change adaptation, has resulted in a drastic reduction of forestry management. In some Mediterranean territories today, barely 30% of the net annual forests growth is exploited.

In between 1950s and 1970s, some northern Mediterranean regions were reforested; millions of hectares with fast growth species, basically natives pine tree, such as *Pinus pinaster* or *Pinus halepensis*. Also allochthones eucalyptus and pine species were included. These monocultural plantations were quite important to increase the economy of some rural regions, fundamentally for the wood and cellulose exploitations or to avoid erosive phenomenons and to decrease flood risks. The profit loss on the forestry industry, ended up in the abandonment of lots of forest plantations during the 1970s. In some Spanish regions such as Galicia, almost 40% of the eucalyptus plantations have been abandoned, with the risks in terms of ecosystems and forest settlements.

**Territorial chaos: a continuum mixing houses and trees.** The drastic increase of areas where forest land is in contact with constructed areas, the so-called wildland-urban interface has made fire hazard increasing and fires to spread today with the same ease through forests, plantations, crops, gardens, houses or urban developments in many countries. The continues movement of people along roads and the intense use of natural space for recreation increase fire incidence due to negligence or accidents. The exact same situation emerges in the suburbia of large cities. As we saw in Funchal (Madeira) in 2016 or Pedrógão Grande (Portugal) in 2017 or Mati (Greece) in 2018, this new scenario has turned what was once a rural or environmental problem into true civil defence emergencies.

Fires in interface areas are more dangerous and pose a growing problem with severe social and economic consequences. Fires jeopardize the safety of people, houses, infrastructure and even firefighting - services.

There are two interface situations in the Mediterranean region. On the one hand, towns or isolated houses in rural areas in the interior. In much of the region, the end of herding, the

***A society with an embedded fire culture, a huge number of unaware visitors, a flammable landscape with very dry vegetation due to successive droughts, houses interspaced in the forests and climate conditions that favor the spreading of fires create the perfect recipe for fire disasters.***

extraction of firewood and the cultivation of small orchards have erased the ancestral mosaic landscape that protected towns in case of fires. Today, forests and housing are so next to each other that in many villages, treetops reach the roofs of houses.

On the other hand, the chaotic urban planning process of the coastal strips and peri-urban areas of large cities has caused housing to invade forests. All coastlines are potentially very dangerous: from Pontevedra (Spain) to Nice (France), and the coastal areas of Italy, Greece and Turkey, and the Balearic Islands, Canary Islands, Corsica, Sicily or Sardinia. The coast is sprinkled by thousands of hotels and urban developments that for the most part lack prevention or self-protection plans. In some countries, such as Turkey or Greece, despite clear legal obstacles against land use change, some forest fires are started with the intention of opening up land for development especially in the more touristy coastal areas, where land is especially valuable, despite the clear legal obstacles.

### **The Mediterranean region stakes its future**

The Mediterranean region has become the first holiday destination in the world. 32% of international tourists select this region, which represents 30% of the world's tourism revenue. The more optimistic forecasts show that the Mediterranean area will reach 420 million tourists in 2020. France, Italy, Spain, Greece and Turkey lead the ranking, with 80% of those arrivals.

This apparently flattering scenario holds a great uncertainty: the high risk of fires. The fateful tourism-fire combination by itself aggravates this already complex situation of disasters in interface areas due to the high volume of persons to be protected and their unawareness of the risk and the territory.

If the region wishes to maintain its leadership in tourism and attracting millions of visitors from around the world, it must face the challenges of the future: understanding the potential risk of fires, preparing and implementing self-protection plans, and informing guests on how to act in case of fires.

Together with these four keys, another factor that becomes more relevant is the simultaneous nature of fire incidents. When the number of fires skyrockets, an exhaustive amount of resources is required, firefighting systems cannot cope, and they frequently cause the collapse of the emergency services. In many regions of southern Europe there are frequently 100 fires per day, with peaks of up to 400 recorded on a single day.



© MICHEL GUNTHER-WWF

*Côte d'Azur (France) July 2003*

# THE COMING FIRES: MEGAFIRES AND CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) warns that Mediterranean ecosystems are among the world's most vulnerable. The expected temperature increase during this century will surely worsen the extreme climate episodes in this region: more pronounced droughts and more and longer intense heat waves that will result in dry vegetation ready to burn. Most surely, summer fire periods will intensify or expanded, the question is to know exactly how much and how we can act.

A recent scientific study led by researchers of the University of Barcelona<sup>12</sup>, published at the end of 2018, suggests that even if the Paris Climate Agreement is observed and the temperature increase remains at less than 1.5° C, the burnt areas of the Mediterranean region will be 40% higher than today. Moreover, at the worst climate scenario with a temperature increase of 3°C, this would duplicate.

However, the effects of global warming are already present, and the region is now warmer and dryer. The effects that we are already experiencing as a consequence of climate change may be summarized in three points:

**Alteration of fire patterns.** The way in which the territory is burning, and flames are spreading has intensified. The combination of long heat waves, accumulated droughts, low humidity in the air and very strong winds in some places, together with a very dry vegetation and very flammable forests, is the perfect cocktail for much quicker fires with unseen virulence. In the serious fires of 2017 in the Iberian Peninsula, flames exceeded 6km/h, a speed three to nine times above the firefighting capacity. Climate change predictions confirm the trend of growth of frequency and intensity in the future.

**Longer and less seasonal risk periods.** Climate change has altered the distribution of fires throughout the year. The high fire risk season is no longer limited to July to September. Summers last an average of five weeks more than 40 years ago. In 2017, the most critical months for extreme fire episodes were June and October, when deadly fires devastated Portugal and the north of Spain.

According to Greek National Observatory (CLIM-RUN project)<sup>13</sup> high fire risk days in Greece could increase to 30 days more in the coming 80 years. Normally fire period in Greece fire period starts on 1st May to 31st October, but the few last years some region in south Greece (Crete, South Evoia or the Aegean islands) start the fire period on 1st of April and end it at the middle or end of November.

12 Marco Turco, Juan José Rosa Cánovas, Joaquín Bedia, Sonia Jerez, Juan Pedro Montávez, María Carmen Llasat y Antonello Provenzale. 2018 «Exacerbated fires in Mediterranean Europe due to anthropogenic warming projected with non-stationary climate-fire models». Nature Communications, 2 de octubre de 2018 <https://www.nature.com/articles/s41467-018-06358-z>

13 <http://www.oikoskopio.gr/map/index.php?lng=en-US>

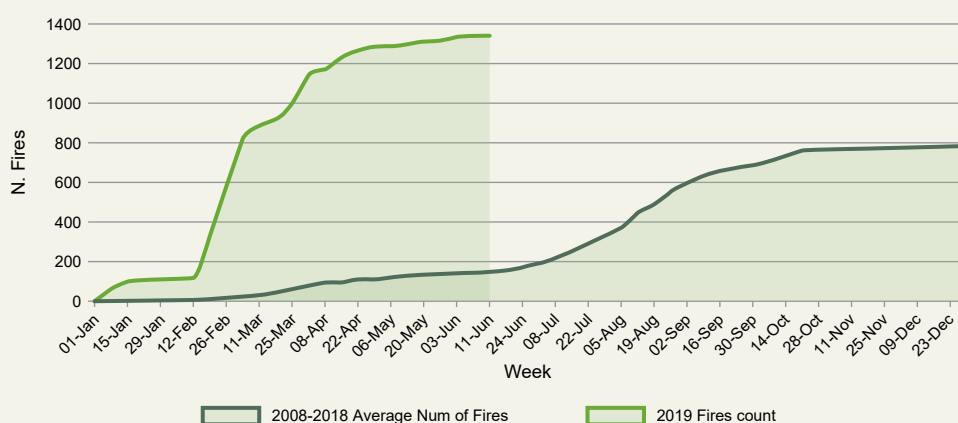


### 2019, a super year:

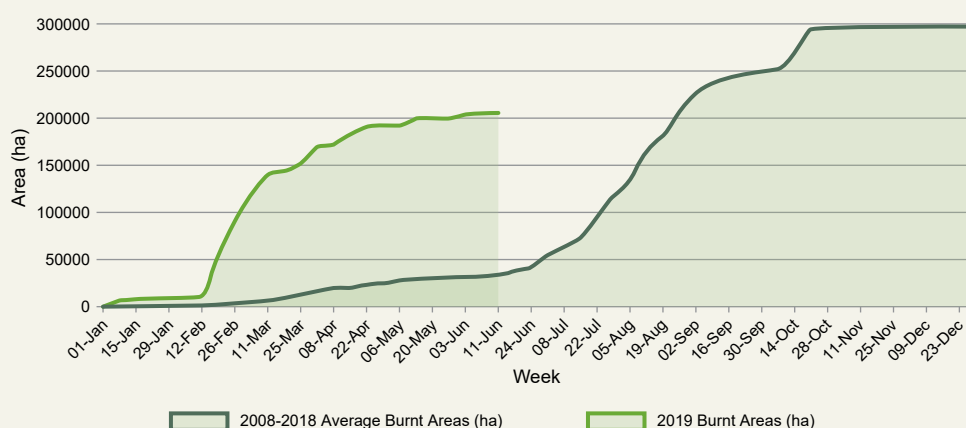
The European Forest Fire Information System (EFFIS) had recorded more than 1,200 fires of more than 30 hectares by mid-May 2019, the same number recorded for the entire season of 2018, when the normal number for this time of year is about 115 events. Additionally, up to this date, 40% more areas than in the entire 2018 have burned. Until now, France, Portugal and Spain are the most affected countries of the Mediterranean because of fire in 2019.

Between January and March, more than 180 fires have been recorded in France, especially in Corsica, well above the 24 average fire incidents recorded throughout the year ¿cuándo?. The average in France for that time of the year was two fires. In Spain, the especially dry and hot winters in the northeast, with precipitations 30% below average, and important social conflicts that raise fire intentionality caused numerous fire waves in Cantabria, Asturias and Galicia. Between January and March this year, 66% more fires have been recorded in Spain, which have destroyed 132% more areas.

**Chart 6. Number of fires in Europe in 2019 in relation to the average for the last decade (2008-2018)**



**Chart 7. Burnt Areas (ha) mapped in Europe in 2019 in relation to the average for the last decade (2008-2018)<sup>14</sup>**



Fuente: EFFIS. [http://effis.jrc.ec.europa.eu/static/effis\\_current\\_situation/public/index.html](http://effis.jrc.ec.europa.eu/static/effis_current_situation/public/index.html)

<sup>14</sup> EFFIS system only maps fires larger than 30 hectares.

***Mediterranean landscapes and societies need to be better prepared for the new climate.***

*Climate change is here to stay and its effects will intensify, and we must urgently adopt adaptation and mitigation measures in order to reduce the foreseen impacts.*

**Expansion of the risk areas.** Last summer, for the first time in history, Europe was simultaneously burning from north to south and from east to west. The impacts of climate change have transformed the summers of temperate regions, traditionally mild and humid, into long hot and dry periods. The areas that currently are less humid will extend to the north from the current Mediterranean areas, and the size of the high humidity area that surrounds the Alps and other mountain ranges will be reduced.

Countries such as the United Kingdom, Ireland, Finland, Latvia, Germany, Poland, Sweden, Norway and even the Arctic Circle, were shaken in 2018 by unusual fire waves for which they are not prepared. Before, in 2017, also Balkans region. At the end of July 2018, 40% more fires were recorded in the European Union. Also, during this last winter, corners of the European geography that were habitually humid and cold, such as the United Kingdom or northern Italy, were hit by numerous unusual rural fires.



©PAULO CUNHA: EFE: NEWS.COM: LA FOTOTECA.COM

Abrantes (Portugal). August 2017

# HOW DO GOVERNMENTS FACE FOREST FIRES?

## ANTI-FIRE POLICIES

Since the 1950s, following the first consequences of land-use changes, ever more frequently, extreme fires are challenging the firefighting capacity of Mediterranean countries. In view of this scenario, are the administrations driving effective policies against fires? Are investments being geared towards avoiding future disasters?

**Table 5. National budgets for forest fires as known by centralized data**

	Investment for forest fires (mill. €)	Investment in prevention (mill. €)	Investment in suppression (mill. €)	Percentage devoted to prevention	Percentage devoted to suppression
Spain <sup>15</sup>	1,300	299	1,001	23	77
France <sup>16</sup>	134	34	100	25	75
Greece <sup>17</sup>	250	20	230	8	92
Portugal <sup>18</sup>	100	26	74	26	74
Turkey <sup>19</sup>	140	N/A	N/A	N/A	N/A

*Note: Italy's investment in forest fire management is unknown. Differentiation between suppression and prevention spending is not possible in the case of Turkey.*

In some of the countries the amount numbers are estimated due to a lack of the Administration's clearness. Furthermore, the exact prevention items on each of the countries are not clearly known, therefore considering the variability of information sources these figures are given to get rough estimates. The comparability between countries is limited, but it serves to highlight the unbalance between suppression and prevention resources in all countries. The cost of fire management in the Mediterranean region amounts to more than 2.000 million euros per year. On average, 80% is used for suppression, while 20% goes to prevention.

In addition to the extreme unbalance, the measures funded as prevention prioritize the construction or reconditioning of forest roads and paths, fire lines, water points or aircraft bases. These measures are important if well planned and dimensioned, but they are clearly actions to support suppression that do not contribute to solving forest problems.

In many cases, public budgets barely include a real and effective prevention that prevents against fires. In many countries of the region, investments for a responsible forestry management or for adjusting the landscape to climate change are minimal. This trend is the result of unbalanced policies that are a bottomless sack addressed to a powerful firefighting system that jeopardizes the implementation of a true forest and territorial policy.

<sup>15</sup> Estimate from Spanish Official School of Forestry Engineers between 2008 and 2017. It includes state and regional investments. The state investment during this period was over 60 million euros in firefighting and 12-15 million euros in prevention. In Spain, regional governments have competence over forests, that is why there are included.

<sup>16</sup> Annual average only of state investments for the period 2009-2018. Source: Sustainable Management indicators 2015, 6.4.a.

<sup>17</sup> For Greece is a general estimation with the available data. There is no official survey for the exact budget. Recently, the Minister of Environment announced a three years fire prevention plan 2019-2021, funded with total 140 million euros.

<sup>18</sup> For Portugal is a general estimation with the available data. There is no official survey for the exact budget.

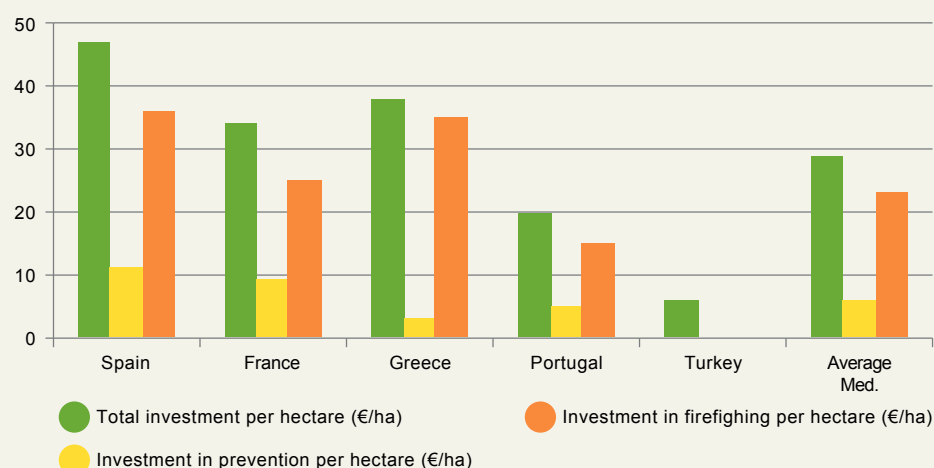
<sup>19</sup> Directorate of Forestry in Turkey, estimates include spending earmarked solely for fire management. Other forest management practices that help lower the risk of fire such as thinning and pruning are not included in this assessment.

Spain is the country with the highest budget in suppression per hectare and has one of the best firefighting systems in the world, but statistics reflect how this system is a victim of its own success: each year the proportion of larger and more dangerous fires grows.

**Table 6. Forest fire management budget per forest area<sup>20</sup>**

	<b>Total investment per forest hectare (€/ha)</b>	<b>Investment in prevention per forest hectare (€/ha)</b>	<b>Investment in firefighting per forest hectare (€/ha)</b>
Spain	47	11	36
France	34	9	25
Greece	38	3	35
Portugal	20	5	15
Turkey	6	N/A	N/A
<b>Average Med</b>	<b>29</b>	<b>6</b>	<b>23</b>

**Chart 8. Investments destined to prevention and extinguishment per country**



**Table 7. Main strengths and weaknesses of national Mediterranean policies**

	<b>Strengths</b>	<b>Weaknesses</b>
Spain	<p>Effective extinguishment mechanism, both nation-wide and regionally: highly effective and qualified.</p> <p>Full database of general statistics about forest fires, nation-wide and per autonomous region.</p> <p>Growing awareness of public opinion regarding fire risks.</p> <p>Adequate regulatory and juridical framework (but failing in its enforcement).</p> <p>Effective civil defence system.</p>	<p>Professionalization of the sector: precariousness of working conditions of fire extinguishment and prevention services.</p> <p>Insufficient analyses of causes and motivations.</p> <p>Limited resources for identifying the perpetrators and low number of penalties and sanctions.</p> <p>Low priority for social prevention: general lack of local programs to reduce the high number of incidents.</p> <p>Lack of prevention from a landscape standpoint.</p> <p>No encouragement to forest owners regarding an adaptive forestry management.</p> <p>General lack of self-protection plans in the interface areas.</p>

<sup>20</sup> A proportion of the forests in these countries are forests that are not as fire prone as the Mediterranean forests.



**Table 7. Main strengths and weaknesses of national Mediterranean policies (cont.)**

	<b>Strengths</b>	<b>Weaknesses</b>
Portugal	<p>Creation of an Agency for the Integrated Management of Rural Fires (AGIF in the Portuguese acronym) to coordinate the implementation of the Integrated Rural Fire Management System.</p> <p>Complete database of the general statistics of forest fires nationwide.</p> <p>Increased awareness of populations for dangerous practices such as fire.</p> <p>Creation of a single command to manage firefighting.</p>	<p>Low efficiency of the civil protection system.</p> <p>High cost of an inefficient system.</p> <p>Low coordination between entities involved in firefighting.</p> <p>Low funding of prevention actions.</p> <p>Low ability to influence the owners in the post-fire restoration.</p> <p>Low level of qualification of the main players in combat.</p> <p>Low levels of associations among owners.</p> <p>Low levels of forest management.</p> <p>Loose territorial planning.</p>
France	<p>Well-positioned fire extinguishment system, fundamentally covers the Mediterranean part of the country that is more exposed to fires.</p> <p>Participation of local population: many local fire brigades are volunteers, therefore they exercise an important task for prevention and early warnings.</p>	<p>High cost.</p> <p>Marked imbalance between the budget used for extinguishment and the investment in prevention and adaptive forestry management.</p>
Italy	<p>The participation of volunteers locally organized by the Municipal civil defence body. There are local volunteer teams well trained to fight against forest fires.</p>	<p>The central structure focused on the prevention and extinguishment of fires (Corpo Forestale dello Stato) was eliminated in 2016. The firefighting responsibility is now fragmented and uncoordinated among several institutions. Lack of investment in fire prevention, especially in protected areas.</p>
Greece	<p>Quick response to fire incidents.</p> <p>Municipalities and local authorities are increasingly active.</p> <p>Effective local schemes of volunteers.</p> <p>New national policy for adaptation to climate change (not yet implemented).</p>	<p>Policies focused on fire suppression and not on prevention.</p> <p>Limited funds for prevention and adaptive forestry management.</p> <p>Lack of local plans for protection against fires.</p> <p>The civil protection system does not deliver against objectives of coordination and civil mobilization.</p> <p>The evaluation of fire risk areas has not renewed since the 80's.</p> <p>Insufficient analysis of causes and motivations of fires, both nation-wide and locally.</p> <p>No national campaign for fire protection with the cooperation of all competent authorities.</p>
Turkey	<p>Organized forestry operations throughout the country.</p> <p>Fire management centres in operation in Antalya and Ankara to centrally manage fires.</p> <p>Modern technology based monitoring and early warning system is being used and developed to prevent large fires.</p> <p>Quick response to fire incidents thanks to fire fighting facilities in fire sensitive areas.</p> <p>Rural populations close to the forests remain, continuing their traditional agricultural practices and wood collecting helping reduce the risk of fire.</p> <p>Fire-resistant forests project is in place to develop and implement prevention strategies. Measures include use of broad leaved species and more fire resistant species such as at the edge of the sensitive forests of usually <i>Pinus brutia</i>.</p>	<p>High levels of investment on firefighting including rental of aircrafts: 2019 rent cost 25 million euros.</p> <p>Insufficient data on the cause of forest fires.</p> <p>Need for more strict enforcement of laws</p> <p>Need for more staff dedicated to fire management.</p> <p>Need for more focus on adaptive forest management.</p> <p>Need for increased emphasis on landscape approach in fire management.</p>

The north Mediterranean region, in addition to lacking enough financial endowment for an active and effective prevention against fires, shows no integrated fire management in the forestry and territorial policies. The administrations still have inverted priorities: they bet on putting off fires quickly and not on avoiding fires from starting and spreading. The European Parliament itself issued a resolution after the July 2018 fires in Greece, asking the European Commission to support the member states in the prevention of fires, understood as forest and landscape management.

At a community level, the European Union does not have a common forestry policy nor integral guidelines for the preservation of forests, adaptation to climate change, creation of a sustainable mosaic and prevention of damages due to fires, pests or diseases. Investments in the forestry sector are articulated via sectorial policies that are not always consistent with fire prevention or adaptation to climate change. The rural development programs of the Common Agricultural Policy (CAP) remain the main financial instrument for the community's forests.

### **How does the European Union faces the catastrophes caused by fires?**

The European Union's Civil Defence Mechanism consists of the coordinated assistance of 41 countries (25 countries of the European Union, 11 European non-EU countries – as Turkey, and 5 Middle East and North Africa countries) and, up to this date, it has been based on a volunteer system: a country asked for help in case of a catastrophe and other member states decided whether or not to offer their assistance. The emergencies with more responses up to now have been caused by fires: between 2007 and 2018, 79% of the activations of this mechanism were due to forest fires.

The extreme fires of recent years have questioned the countries' ability to help each other, especially when several of them are simultaneously facing the same catastrophe.

To correct the current deficiencies, and as a supplement for the volunteer system, in May 2019, the European Commission approved the launching of "RescEU", a specific reserve of European Union resources that, among others, includes aircrafts for fire suppression.

However, this mechanism should not only serve to move means and water, but also to share the knowledge available. The mechanism makes expert teams available to the States, and the countries must have the courage to ask for it in order to improve their knowledge and allow for an exchange of experiences. After the fires of 2017, Portugal requested one of these advisory missions. Sweden, on the contrary, in spite of having the largest deployment of means to this date, rejected the expert commission last summer.

## LESSONS LEARNED

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Even Northern Europe is facing a pattern of fires of growing intensity. The current exposure in the southern regions may help understand what will happen in the north, since climate change will bring future climate conditions that will make the Mediterranean ecoregion will expand north.

In these countries, with large forest extensions and little experience in forest fires, forestry services haven't had the chance to address the problem and to develop tactics and strategies. In a short time, they have gone from a pattern of small and rare fires to one of large fires.

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### FIRES ARE A SOCIAL PROBLEM

Human activity is the main cause of forest fires. WWF is convinced that only through a detailed knowledge of causes will it be possible to reduce the number of fire incidents. An average of 30% of the causes of fire incidents in the Mediterranean region is unknown. Further, the motivations for more than half of intentional fires are unknown. Until we know the true causes of fires, it will be difficult to avoid them.

WWF is convinced that the governments should analyze their respective social contexts and rely on ambitious social prevention policies geared towards avoiding the start of fires. These policies should be based on a study of the causes and motivations, the identification of perpetrators, an effective enforcement of penalties, a search for alternatives to the use of fire in rural areas, rewards for good practices and a greater effort for awareness about the growing danger of fires.

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### SUPPRESSION IS IMPORTANT, BUT NOT THE SOLUTION

The current fire management policy, based in many countries solely on an advanced firefighting system, is obsolete and ineffective for combatting mega fires. Governments are addressing fire problems as they did 40 years ago, but the problem has undergone a radical change. This policy was effective under normal climate conditions and when the territory was used but they are clearly insufficient for avoiding extreme events with the current landscape and climate conditions. However, the failure of the system was evidenced at the end of the 80's, when the suppression methods were ineffective for the first time. Today, the recipes of the past are no longer valid. The territory and the climate have changed, and all the potential problems have joined together.

Each time, outbreaks are fought sooner, but when an outbreak is defiant due to certain fuel loads and extreme climate conditions, it is impossible to put it out. Decades ago, one could not imagine fires that burned 14,000 hectares per hour. Today, in spite of having more means to fight them, they occur.

Statistics show that irrespectively of how effective we are in early suppression, we fail to reduce overall fire risk. Indeed, in the lack of proper forest management and fire prevention measures at the landscape level, the putting out small or medium size fires, could even aggravate the problem as suggested by the "suppression paradox." There is only one effective way to counter the growing risk of forest fires and that is to treat suppression as a "last resort" and refocus our energy and investments in the prevention of forest fires through active forest management, risk planning and vegetation/infrastructure

management at the landscape level, social mobilization and ultimately climate resilient spatial planning.

Meanwhile, firefighting services will continue to play an important role in civil protection and fire management and for that should be appropriated with adequate resources, well trained staff, proper scientific guidance and the active collaboration of all other services.

## THE PROBLEM IS THE ACTUAL LANDSCAPE

The current fires are not the problem, they are the consequence. Flames are only the visible part of a deeper problem: the Mediterranean landscape has become a large powder barrel.

Today, much of the north Mediterranean arc is a flammable forest landscape, much more vulnerable to fires due to current ecological stage of forest/shrub land, the lack of land management and a growing interface with urbanization that has respectively exponentially multiplied the amount of forest fuel available and the risk of ignition: small crops and orchards have practically disappeared, extensive herding is endangered, forest plantations are growing and some abandoned, there is no forestry management, urban planning is lacking and population nuclei do not have adequate protection measures.

The situation is different in Turkey, where nearly all forests are managed by the General Directorate of Forestry under the Ministry of Agriculture and Forestry and planned forestry operations continue throughout the country. These operations include timber harvesting, forest tending (pruning, thinning, brashing etc.), helping lower the risks of fire.

WWF is convinced that the only way to avoid that large fires keep devouring whole districts each summer is to work for a territory that is less risky due to true urban and landscape planning and with forest less flammable and more resilient to climate change, i.e. a more diverse and heterogeneous mosaic landscape, recreated through active forest management and long-term multi-purpose spatial planning.

The core idea is to create landscapes to reduce emergencies, more than defending them from emergencies.

## IN VIEW OF LIMITED RESOURCES, PRIORITIZE: HIGH FIRE- THREAT AREAS

The large forest areas of the European Continent and the Mediterranean region, the limited financial Resources assigned to the forestry sector and the succession of recurring fires always in the same areas force governments to prioritize their prevention tasks.

In Spain, WWF has been defending for years the idea that identifying the High Fire-Threat Areas (HFTA) based on the frequency and hazard levels, and prioritizing prevention plans in these areas, could result in a major decrease of the effects of large fires. This was developed in France for both fire fighting infrastructure and day-by-day information of the general public on forest risk. In Turkey, high-fire threat areas have been prioritized and accordingly, more resources have been allocated to fire management (suppression as well as prevention, despite at a smaller scale) in these areas.

For this, governments must focus on having deep knowledge, for each region, of the areas where fires are more likely to start and which landscapes are most vulnerable to extremely



severe consequences from a social and environmental standpoint, paying special attention to determining the areas that are potentially beyond extinguishment capabilities.

Additionally, once the HFTA have been identified and characterized, specific plans for social prevention at landscape scale must be applied.

## THE NEED TO ACTIVELY MANAGE VEGETATION AND FOREST FLAMMABILITY

In the search for landscapes more resistant to megafires, we need to start planning for measures that will reduce forest fuels and promote the resilience of settlements, productive space and infrastructures.

The rejuvenation of the retracting forestry, free-range stockbreeding and marginal agriculture activities, is a necessity and can be pursued through financial incentives for production and other market tools including payments for ecosystem services and the development and marketing of high-quality products. Yet, given the current socioeconomic circumstances, such measures can only be effective in the long run and mostly on an incremental manner.



*Doñana (Spain). June 2017*

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***Prescribed burning is the controlled use of low-intensity fires to reduce the burden of vegetation. Something as promote the use of “good” fire to prevent the “bad” fire.***

The active management of vegetation with the aim of climate resilience is also an important piece of the toolbox that needs to be developed. In the case of forest fires, this should include the clearance of vegetation along transport infrastructures, the recreation of forest openings and breaks, the creation of natural fire breaks and the substitution of fire-prone forest species (like eucalyptus or pines) with fire-resistant species in and around settlements and tourism hubs. Such measures should become an inherent part of fire prevention designs and should be actively promoted by local authorities and central services.

Another potential tool is the use of prescribed and planned burnings or the controlled management of low-intensity fires. Although national legislations and know-how on the use of this tool varies along the Mediterranean, it should be considered as an option to both reduce fire risk and ease tensions around the use of fire as a traditional land management tool. There is growing social consensus about the important ecological role of fire in the dynamics of Mediterranean forest fires, and from an ecological standpoint prescribed fires are compatible with most Mediterranean ecosystems. However, their application should not be generalized as they may be incompatible with certain ecosystems or competent services could lack the technical capacity to apply them. Caution is also needed, as in some social settings it could have a reverse effect in indirectly encouraging the uncontrolled use of fire as a vegetation management tool by land-users. Prescribed burning could be a usefully tool, especially in the short term, while increasing demand of biomass for energy, could promote forest management and harvesting in the medium and long term.

Overall, WWF is convinced that European forestry administrations, civil protection authorities and local administrations need to actively promote the creation of resilient ecosystems with the utilization of measures that see to the reduction of forest fuels, the recreation of the landscape and the reduction of fire vulnerability in areas of increased human risk. Such interventions can go hand-in-hand with forest conservation in so long as they are part of a landscape planning process that sees that they are applied in an orderly fashion.

It is time we move away from fighting fire and towards managing it.

# WWF RECOMMENDATIONS

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There is full technical and scientific consensus that the fire problem has changed. How much more will we have to wait for in order to change the way we cope with them? Do responsible politicians truly believe that an suppression-based policy will avoid megafires? How many more tragedies must occur to understand that the events in Portugal, Greece and Spain were not fortuitous?

WWF proposes an action plan that improves governance, addresses the structural causes in the territory and fights against climate change, appealing to the shared responsibility of the whole society.

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## AT REGIONAL LEVEL

**Community Fire Prevention Strategy.** Currently, the preventive task of the European Union is based on gathering data through the advanced European Forest Fire Information System (EFFIS) and the joint financing of forestry policies of member states. Moreover, the European Commission must go beyond this and approve a Fire Prevention Strategy for the community, with the participation of all countries in the region and stakeholders, setting adequate long-term prevention measures to achieve a more diverse, heterogeneous and fire-resistant mosaic landscape.

**Follow-up system.** The European Commission must enable a follow-up system for the enforcement of policies and use of community funds for the prevention of fires in the member states, which allows knowing in detail the measures enforced, their budget line items, their results and lesson learned.

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## AT A NATIONAL LEVEL

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### REDUCING THE HIGH INCIDENT RATE AND PUTTING AN END TO IMPUNITY

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**Knowing the causes and motivations.** Governments must increase their efforts to investigate the causes and motivations of fires in order to more effectively adjust the solutions to the actual social conflicts and stop fires that are avoidable.

**Sentencing and punishing.** Governments must improve the current effectiveness in identifying the perpetrators, and sternly enforce penalties and sentences in order to dissuade those behind the fires and end the current impunity.

**Social prevention.** In areas with high recurrence of fires, local administrations must implement social intervention programs adjusted to the territorial conflicts, based on dialogue and the search for alternatives to the indiscriminate use of fire as a tool employed in agricultural or stockbreeding activities.

**Generate risk awareness.** Promote effective environmental awareness and education programs, addressed to both urban and rural populations, seeking to improve social awareness of fires, knowing the risks and recovering the bond with forests.

## PREVENTION AT LANDSCAPE LEVEL

### REDUCING THE LANDSCAPE'S FLAMMABILITY

**Integrate land policies.** Land distribution and management policies must integrate fire prevention principles in order to achieve a more diverse, heterogeneous and fire-resistant mosaic landscape.

**Identify criteria to know the risks<sup>21</sup>.** Mediterranean governments must coordinate the identification of consistent and comparable guidelines and criteria for defining high fire-threat areas.

**Identify the most threatened areas<sup>22</sup>.** Competent administrations must identify, characterize and map high fire-threat areas (HFTA), including the urban-forest contact areas, to prioritize the prevention tasks.

**True and effective preventive plans<sup>23</sup>.** Administrations must promote specific plans for active prevention in high-threat areas seeking to make forests more resistant to future impacts and going beyond the actions that support the extinguishment of fires. These plans will be based on diversifying the uses and exploitations, sponsoring forestry management, betting on extensive herding and agro-forest systems. The active management of vegetation (including the substitution of forest species, and the use of prescribed and planned burns) and planned grazing<sup>24</sup> are options for preventive planning at a landscape level. Moreover, as part of fires plans, hunting should not be allowed during high fire risk seasons. Inventory of forest plantations. Administrations must know in detail the location of highly flammable habitats, as forest plantations, mostly of eucalyptus and pine trees or maquis, their condition, use, management, fuel loads and the owners thereof.

**Reverse forest abandonment.** Forest plantations that are abandoned to their fate must be intervened and improved by the administrations and, with the participation of stakeholders, plan their uses to diversify the landscape, for example, through fire breaks due to agricultural land (ex cleaned olive or grape fields) or technical sheltered fire breaks.

Delimit the area of forest plantations. Administrations must delimit the land destined for intensive forest crops (as eucalyptus species in Portugal or Spain), taking into account social, economic and financial aspects, conveniently certified by the Forest Stewardship Council (FSC) in order to ensure a proper forest management. Moreover, species diversity of the plantations should be increased and where appropriate, more native broadleaved species should be included in plantations.

**Promoting the use of the most adaptive species to Mediterranean climate.**

Administrations must start an specific program in order to incentive leafy reforestation with less short term profit but better in the medium and long term.

<sup>21</sup> These measures already exist in France.

<sup>22</sup> Idem

<sup>23</sup> Idem

<sup>24</sup> Planned grazing should include training and certification of herders/shepherds and delineating of their areas of responsibility. This way, shepherds will be better educated and take responsibility of the areas they use for grazing their animals.

## POST-FIRE RESTORATION THAT AVOIDS FUTURE RISKS

**Consistent restoration.** Promote restoration projects in the areas where this is needed and feasible, reviewing the patterns of the burnt masses, prioritizing the preservation of the soil, betting on native forests, mixed and irregular, and enhancing their functionality. Strategies that encourage a mosaic landscape, integrating agricultural and pasture areas that break large fuel continuity. Avoid use of heavy machinery in post fire areas and where appropriate, employ non-intervention and allow for natural regeneration.

**Ensure enforcement of laws.** Prioritize enforcement of laws on post-fire areas especially in those countries zoning amnesty is practiced, and where opening up land for development where this is a continuing concern. Ensure policies such as zoning amnesty is keeps burnt forest areas out of scope.

## ECONOMIC PUBLIC POLICIES TO IMPROVE THE SECTOR'S PROFITABILITY

**Green tax policy.** Governments, where forests are largely privately owned, should approve a tax system based on the principle of “whoever preserves, receives” by way of tax bonuses or payment for environmental services that stimulate forest management. This policy must promote a specific program to encourage and compensate owners who bet on lush plantations such as chestnut, oak, walnut or cherry trees, which are less profitable in the short term.

**Collective forestry management.** Administrations, in areas where forests are largely privately owned, must stimulate groups of owners and endow them with the technical ability to promote joint and profitable management programs at a landscape level.

**Public procurement.** Administrations should approve responsible public procurement policies to encourage the local consumption of forest products instead of other more energy intensive and contaminating products such as steel, cement and plastic. These policies prioritize products certified by the FSC (Forest Stewardship Council), the only system that provides an independent verification, offering trustworthy guarantees to consumers of a forest management that is committed to nature, beneficial for society and economically viable.

**Invest in engineered wood products (EWP) and related technologies:** Increased use of EWP and improved EWP technologies could allow for more profitable use of smaller trees and branches from well-managed forests. This practice would help render forest thinning and pruning more profitable and help reduce the risk of fire.

## IMPROVING CIVIL DEFENCE CAPACITIES

**Improving the emergency coordination.** Administrations must prepare security and operations protocols, coordinated among all participating agencies, clearly describing the duties and responsibilities of each of them.

**Emergency planning.** In this line, municipalities must approve Land Emergency Plans that include prevention measures, but also those for confinement and protection of the population. The better organized emergency plans are, the more fire-suppression mechanisms will leave free to concentrate on the actual management of the fires.



**Risk culture education.** Municipalities and Mayors' offices must establish technical and social mechanisms to inform the neighbours about the real threat for the settlement and offer recommendations adjusted to good self-protection practices, as well as behaviour guides for cases of fire.

**Self-protection:** The population must assume the responsibility of living or vacationing in urban-forest interface areas and apply self-protection plans geared towards protecting their property, reducing the potential spread of fire to other properties and ensure the security of the extinguishment devices. This at both an urban development and a plot level.

## IMPROVE THE FIRE MANAGEMENT GOVERNANCE

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**Improve prevention and suppression coordination.** Prevention and suppression issues must be well coordinated and planned by the same institution. Firefighting strategies designed and executed by the specific teams that do not get part of the prevention planning end up in a loss of the opportunity hold to increase the suppression succeed.

## FIGHTING AGAINST CLIMATE CHANGE

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**Energetic transition towards an efficient and renewable model:** Governments must accelerate the energetic transition towards a future free of fossil fuels, such as coal, oil and gas, with policies that sponsor much more ambitious renewable energies and saving policies.

**Reducing uncertainty and increasing adaptation capacity.** Governments must develop specific climate scenarios for the various regions and design adaptation measures. Adaptation measures should include "close to nature" forest management that increases genetic, species and landscape diversity. Additionally, in order to increase the absorption of emissions and contribute to mitigating climate change, an adequate forest preservation is necessary.

**Improving connectivity.** Administrations must develop national connectivity plans that increase the resilience of forest systems in view of the effect of climate change and that encourage the restoration of ecosystems. Increased connectivity would help natural migration of species to areas where they will find more climatic conditions appropriate for their needs. Where natural migration is not possible, assisted migration options such as seed transfer should be employed.



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*Mugla (Turkey)*

# The Mediterranean burns

96%

humans are responsible for 96% of fire incidents

375,000

average of hectares burning every year

56,000

average of fire incidents every year

2017

first megafire in the Northern Hemisphere



## Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony and nature.