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Fire protection in Greece: What is missing?

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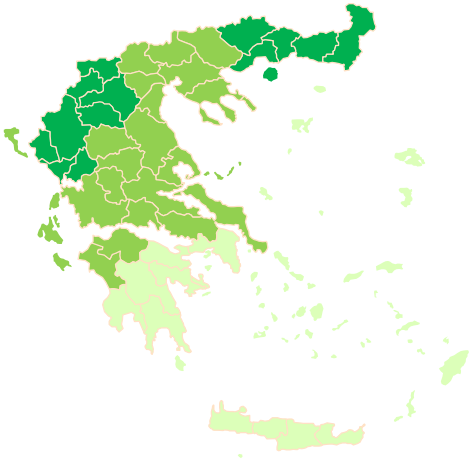
Introduction

Greece is suffering systematically from forest wildfires resulting in environmental damage, loss of property and loss of life

- Despite the recurrence of fire events and a tradition of organised firefighting, the outcome of wildfires has been devastating in more than one occasion
- **Greece has about 8,116k Ha non-urban area**, representing about **62%** of its total area with an average of **1,449 fires p.a.** over the last 37 years
- Fires tend to start in lightly populated, medium density areas, in the Southern part of the country. Islands and cultivated areas are practically immune to fires
- About **15,500 people** are engaged in firefighting in Greece and the **annual cost exceeds € 500mn**

2017 Forest coverage (by NUTS 2 region)



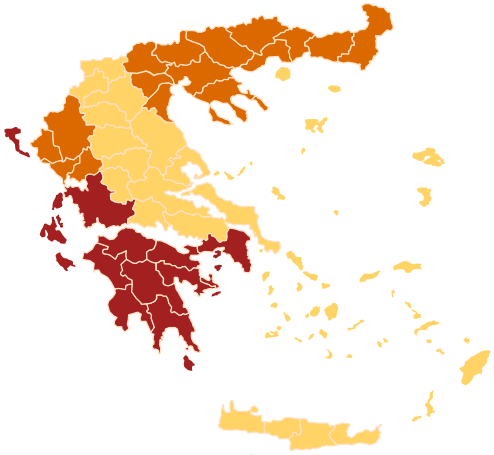
Source: Eurostat

> 40% forest coverage

Between 25% and 40% forest coverage

< 25% forest coverage

2017 Burnt areas (by NUTS 2 region)



Source: Fire Service of Greece

> 1,000 Ha of burnt areas

Between 1,000 Ha and 300 Ha burnt areas

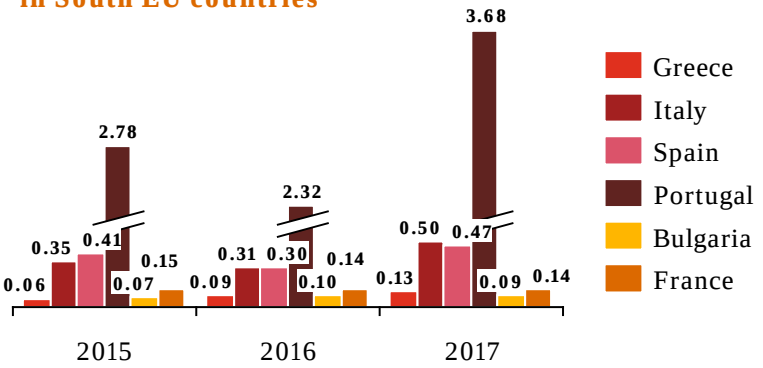
< 300 Ha of burnt areas

The fire protection context

Forest wildfires is a common phenomenon in Greece which occasionally leads to injuries and loss of life and which consumed €510mn for fire fighting in 2016

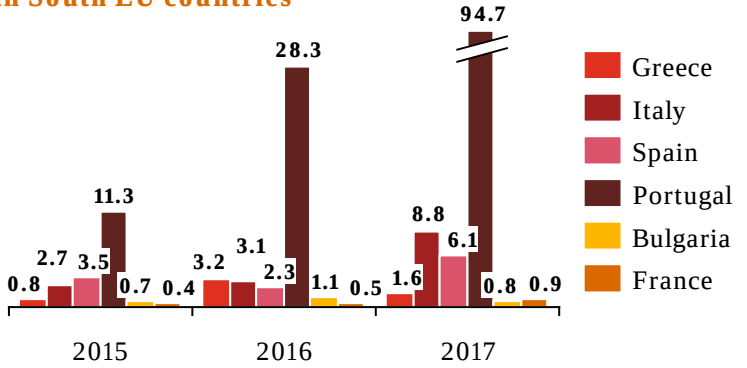
- *The vast majority of fires is a result of **negligent behaviour of humans** and few cases are attributed to deliberate actions, atmospheric phenomena or accidents*

Number of forest fires (per 1,000 non urban hectares) in South EU countries



Source: European Commission (European Forest Fire Information System)

Burnt forest area (per 1,000 non urban hectares) in South EU countries



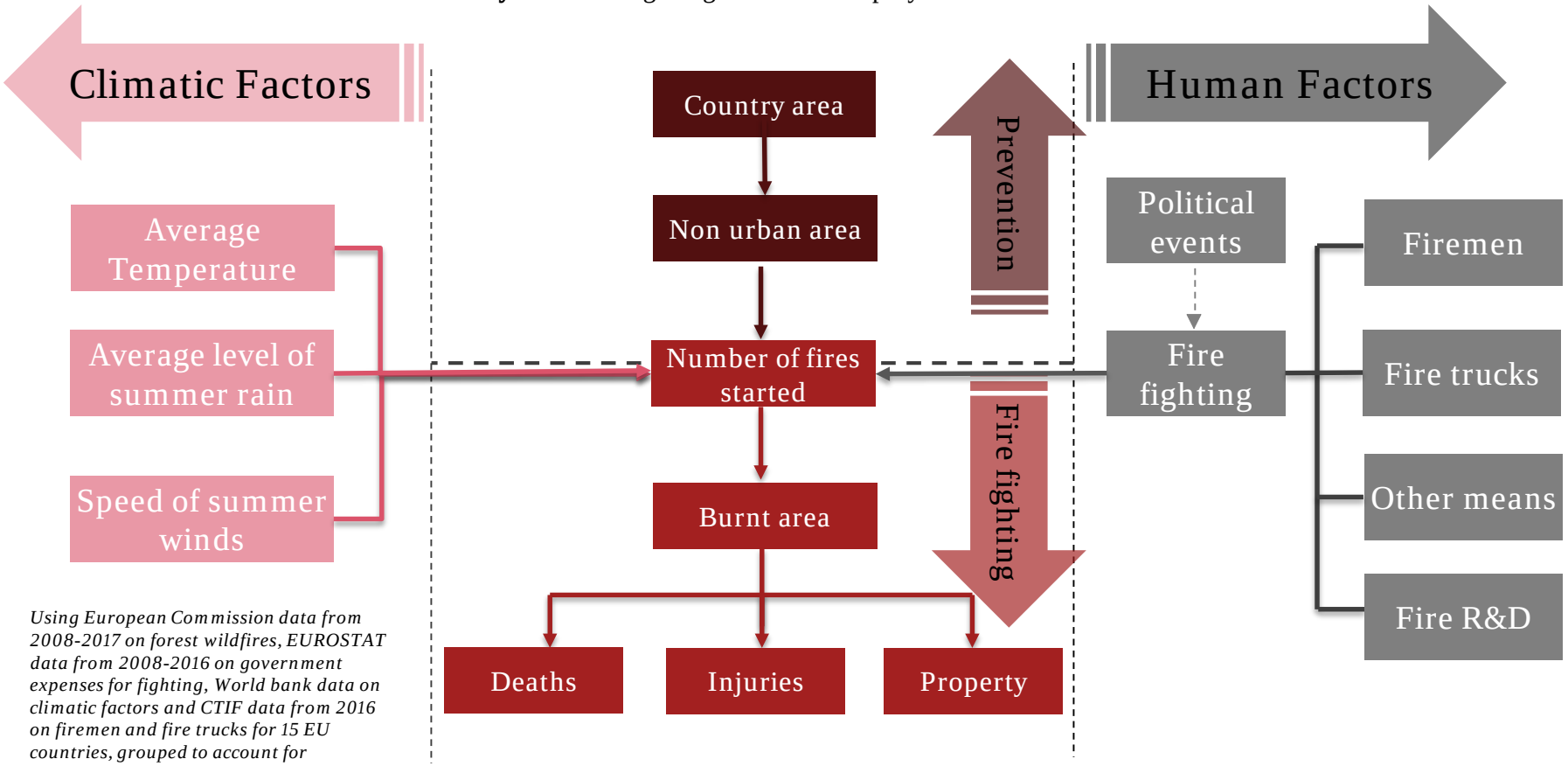
Source: European Commission (European Forest Fire Information System)

- In battling with wildfires there are two broad processes:
  - **prevention** is limited to influencing behaviours so as to **reduce negligence** and deter arsons
  - **firefighting** involves the activation of a single purpose built apparatus whose objective is to restrain, contain and eventually defeat any wildfire
- The **temperature**, the prevailing **winds**, the sustained **humidity**, the type of **fauna** and **vegetation** in the forest and the **morphology of the ground** are all factors that determine the speed and strength of the wildfire
- There is evidence that **political events affect the extent of wildfires** *(N. Christodoulakis, S. Skouras, "Electoral misgovernance cycles: evidence from wildfires and tax evasion in Greece", 2012)*
- At the surface, **Greece appears to be the least stricken from wildfires** South European country in the last three years

The fire protection rationale

Three pertinent issues in containing the **damage inflicted by forest wildfires** need to be addressed:

- the **frequency of their occurrence**, which critically depends on the size of the non urban land on which they develop and the climatic conditions
- the **extent of the damage** caused by each fire
- the **effectiveness and efficiency** of the firefighting resources employed

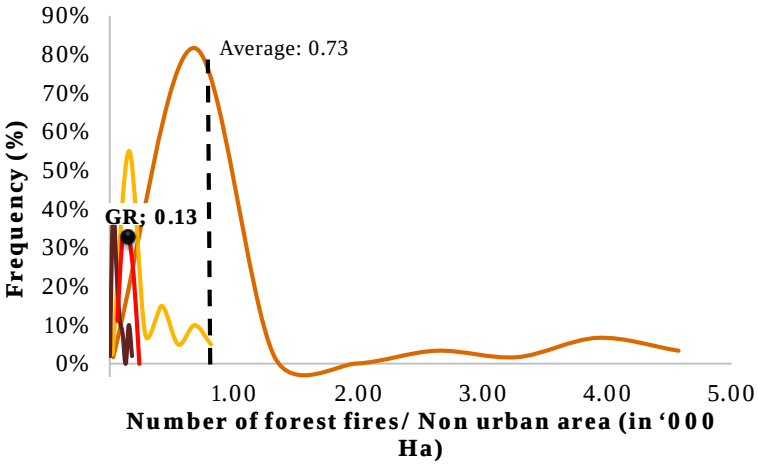


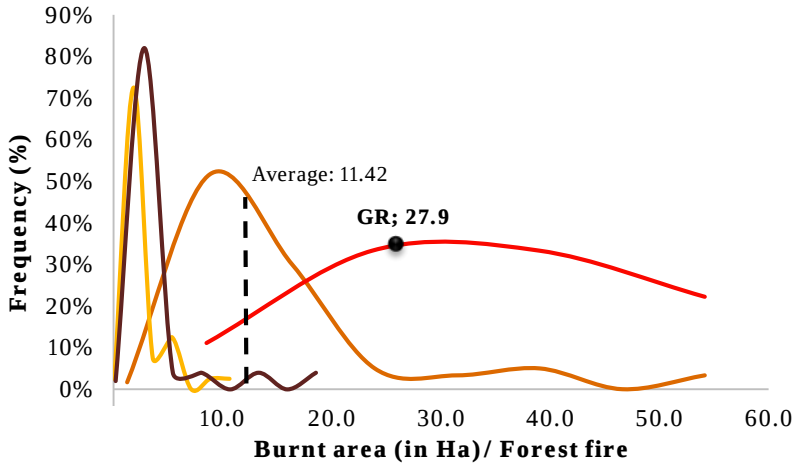
Using European Commission data from 2008-2017 on forest wildfires, EUROSTAT data from 2008-2016 on government expenses for fighting, World bank data on climatic factors and CTIF data from 2016 on firemen and fire trucks for 15 EU countries, grouped to account for systematic climate differences we address these issues (Data and definitions in Appendix)

Greece's fire protection record

Greece over the period 2008-2017 had had a below the average number of fires per 1,000 Ha of non-urban land but the largest area burnt per forest fire, at 27.94 Ha

There are **significant differences between South, Central and North EU countries**, which are partly due to **climatic differences,** but partly could be explained by the **overall quality of the fire protection apparatus**



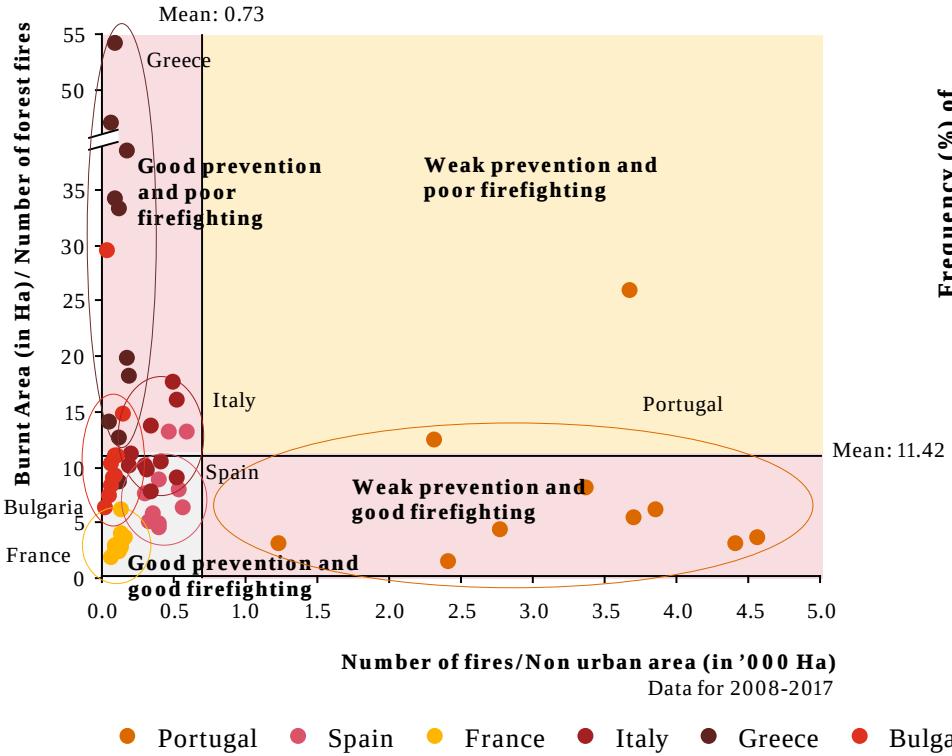


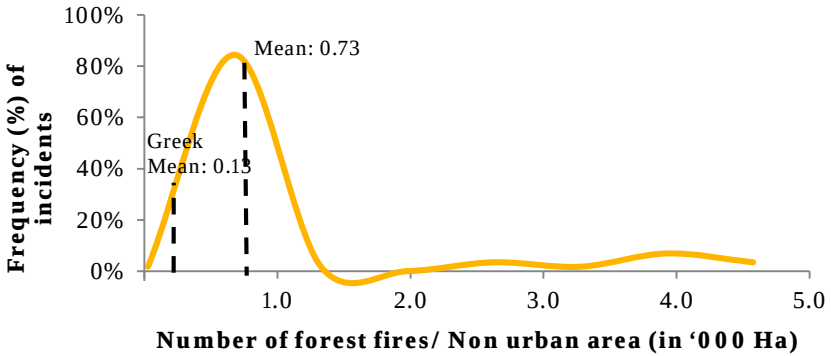
	South EU	Central EU	North EU	Greece
Average summer temperature (in °C)	21.4	18.2	15.3	23.4
Average summer rainfall (in mm)	42.0	89.5	74.2	22.0

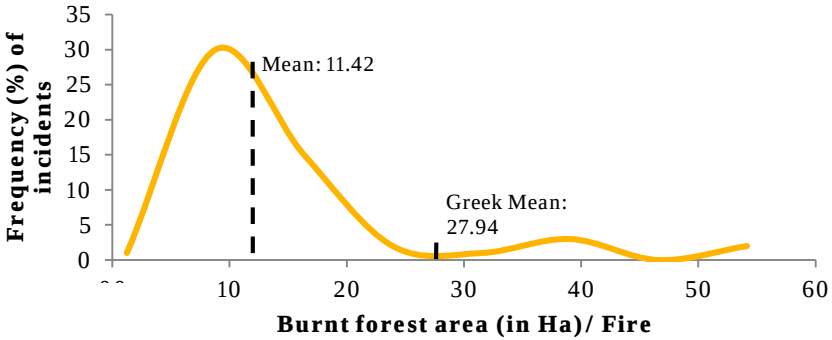
Summer: June-August

- Climatic conditions appear to influence more the start of the fire and less its extent and damage
- In general, the incidents of forest fires represent a regular phenomenon with a fat tail but the fire impact is less regular

Greece appears to have a good prevention but a poor firefighting record amongst its South Europe peers

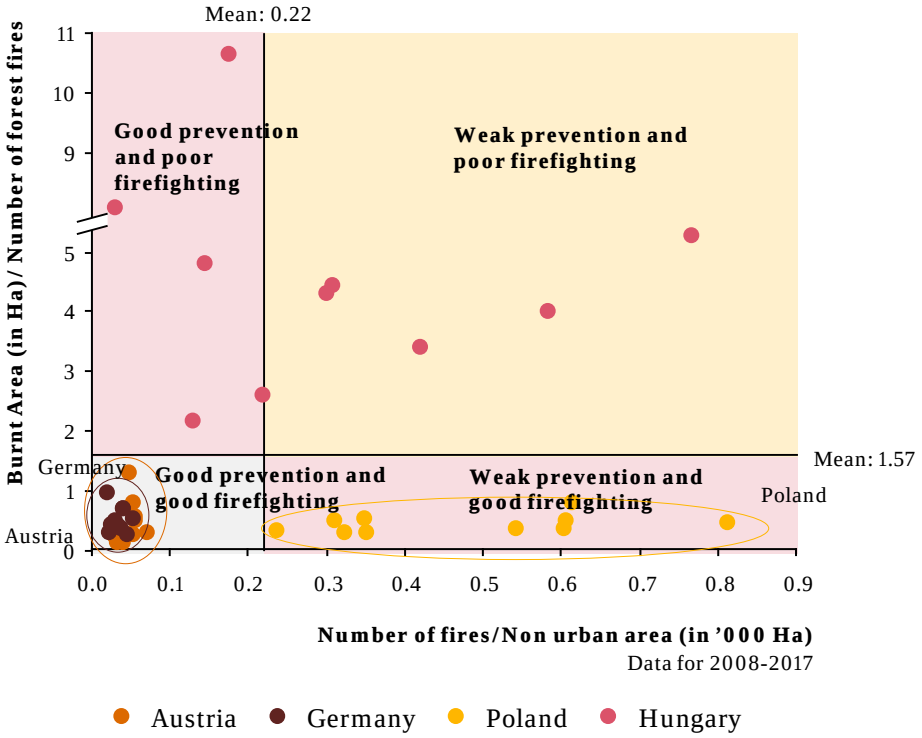


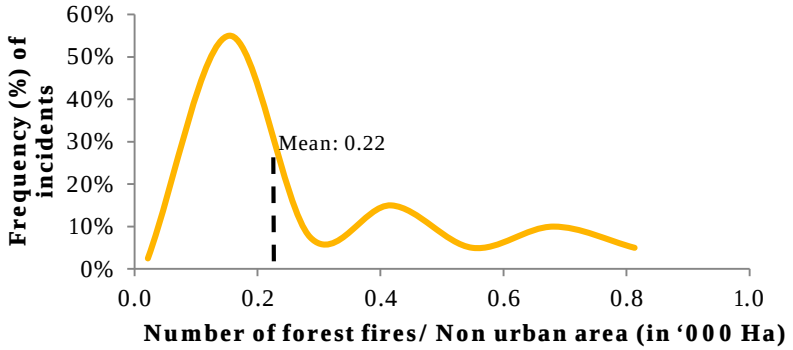


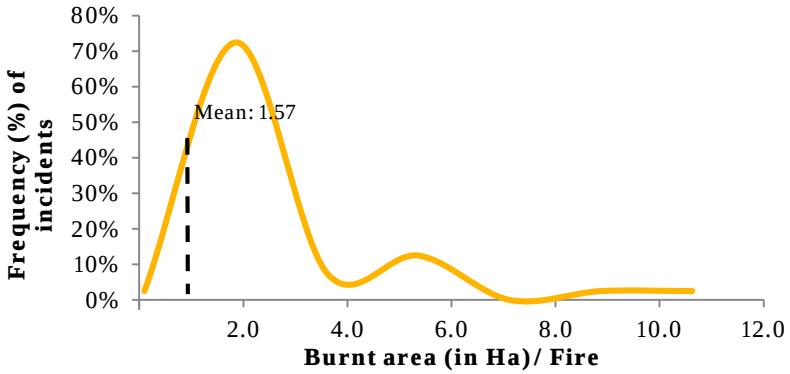


- South EU countries have an **average of 0.73 forest fires per 1,000 non urban hectares** and the average outcome is 11.42 hectares burnt per fire
- **Greece has good fire prevention** in comparison with other South EU countries, with **forest fires occurring 5.5** times less often than the average. However, its **firefighting effectiveness is poor, resulting in 3.5 times the average burnt** hectares per fire
- On the contrary, fires in **Portugal start more frequently but its firefighting mechanism prevents a lot of damage**
- The concentration of fire statistics suggests an **overall good fire protection mechanism**, as in the case of **France, Spain** and **Bulgaria**

Central EU countries have the lowest ratio of burnt forest area per forest fire, implying more effective firefighting compared to other EU countries

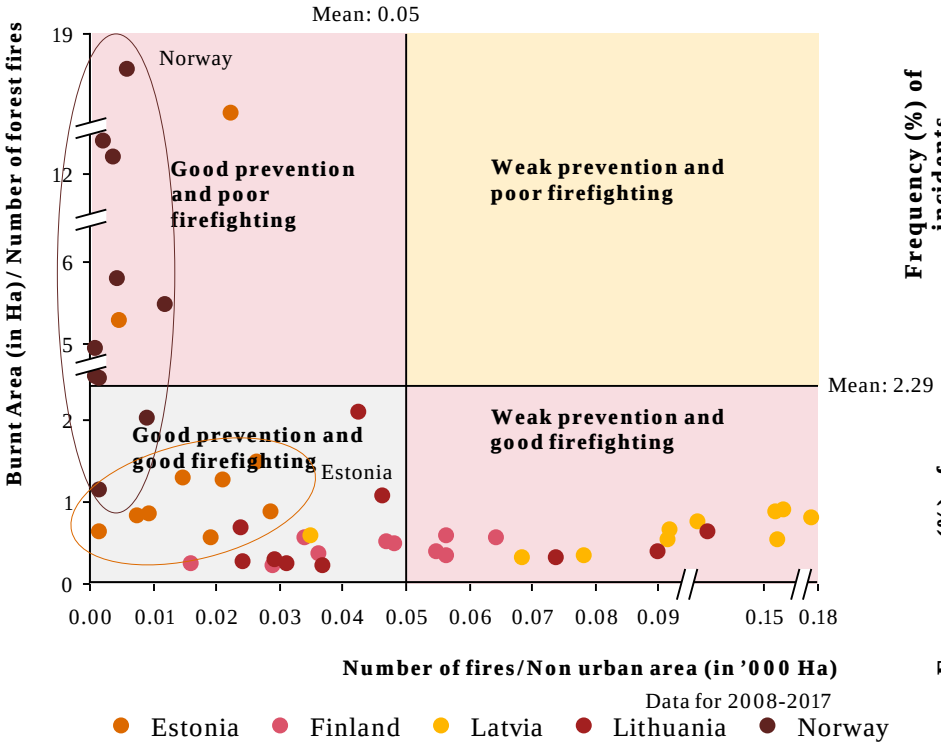


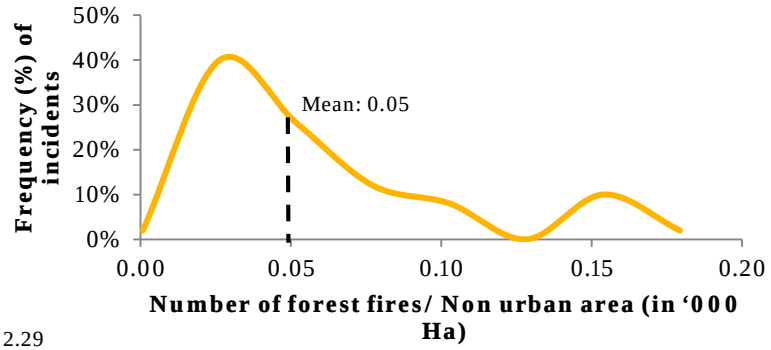


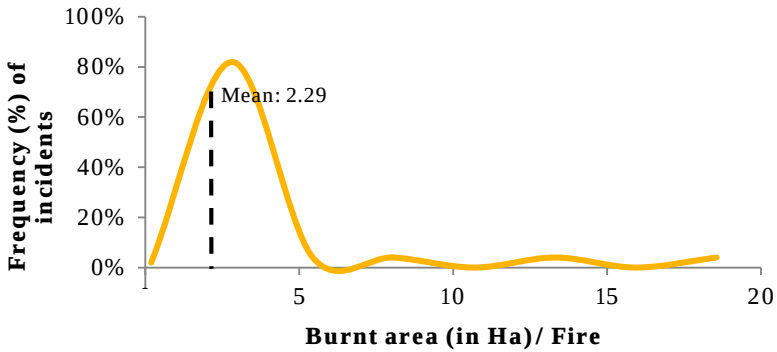


- **Central EU countries average 0.22 forest fires** per 1,000 non urban hectares, about 30% of South Europe, with an average outcome of 1.57 hectares burnt per fire (7 times less)
- **Poland seems to have a consistent problem with the number of forest fires that occur, but makes up for it** with good firefighting
- **Hungary suffers from overall poor fire protection**
- The concentration of fire statistics suggests an overall good fire protection mechanism, as in the case of **Germany** and **Austria**

Northern EU countries benefit from lower temperatures and higher levels of rainfall, resulting in a very low relative number of fires but not proportionally low damage







- **North EU countries average 0.05 forest fires** per 1,000 forest hectares, the lowest amongst other regions and have an average burnt area of 2.29 hectares per forest fire, about 50% more than Central European countries
- **Firefighting** is generally good in North EU, but prevention is very uneven
- The concentration of fire statistics suggests an overall good fire protection mechanism, as in the case of **Estonia**

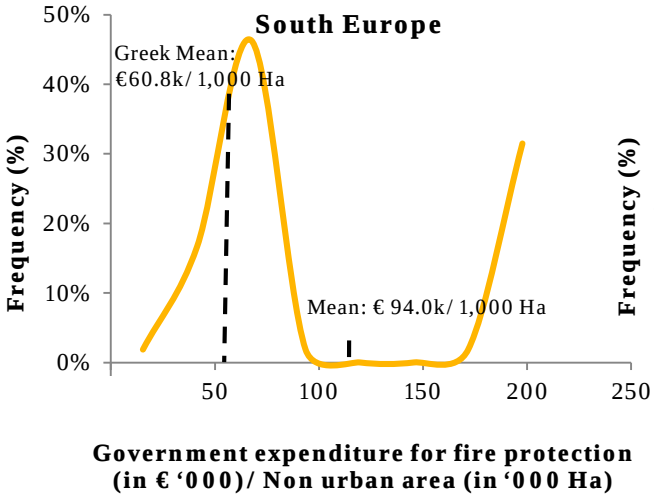
Greece emerges as ineffective compared with its peers in coping with forest fires

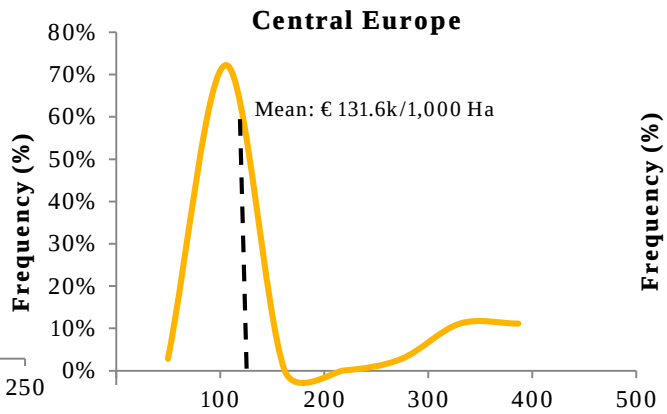
- Greece over the period 2008-2017 had had a below the average number of fire incidents per 1,000 Ha of non-urban land, but the largest area burnt per forest fire, at 29.67 Ha
- Greece appears to have a good fire prevention but a poor firefighting record compared with its South Europe peers
- There are significant differences between South, Central and North EU countries, both in prevention and firefighting, which partly are due to climatic differences
- Central EU countries have the lowest ratio of burnt forest area per forest fire, implying consistently more effective firefighting compared to other EU countries
- Northern EU countries benefit from lower temperatures and higher levels of rainfall, resulting in a very low relative numbers of fires, but not proportionally low damage
- In terms of overall fire protection effectiveness, France, Spain, Bulgaria, Germany, Austria and Estonia are ahead of other EU countries

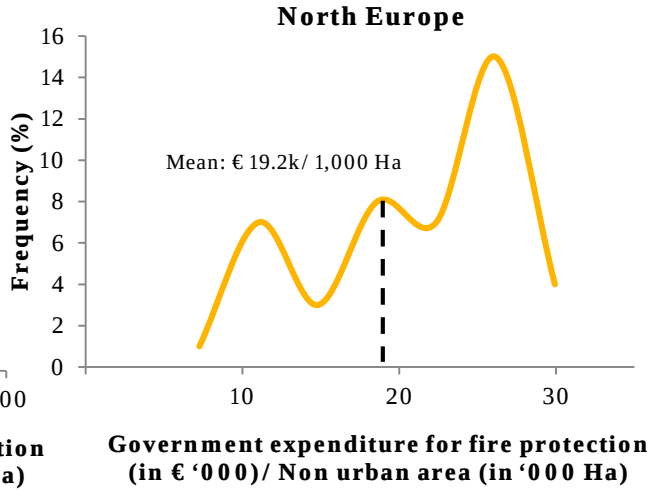
Effective and efficient firefighting

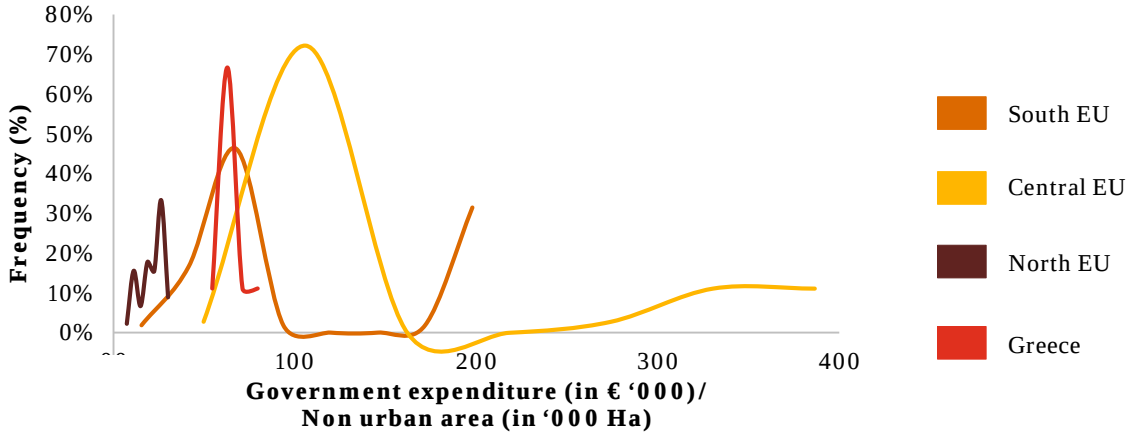
Greece is spending below the average amongst South EU countries for overall fire protection per 1,000 Ha of non urban land

- On average, **Central European countries spend 40%** more on fire protection per hectare than South and about seven times more than North European countries
- Fire protection spending appears to be normally distributed over time with some **heavy spenders (Germany, France and Italy**)
- Germany is the highest spender, with an average of € 319k/ 1,000 Ha or about 5.3 times more than Greece

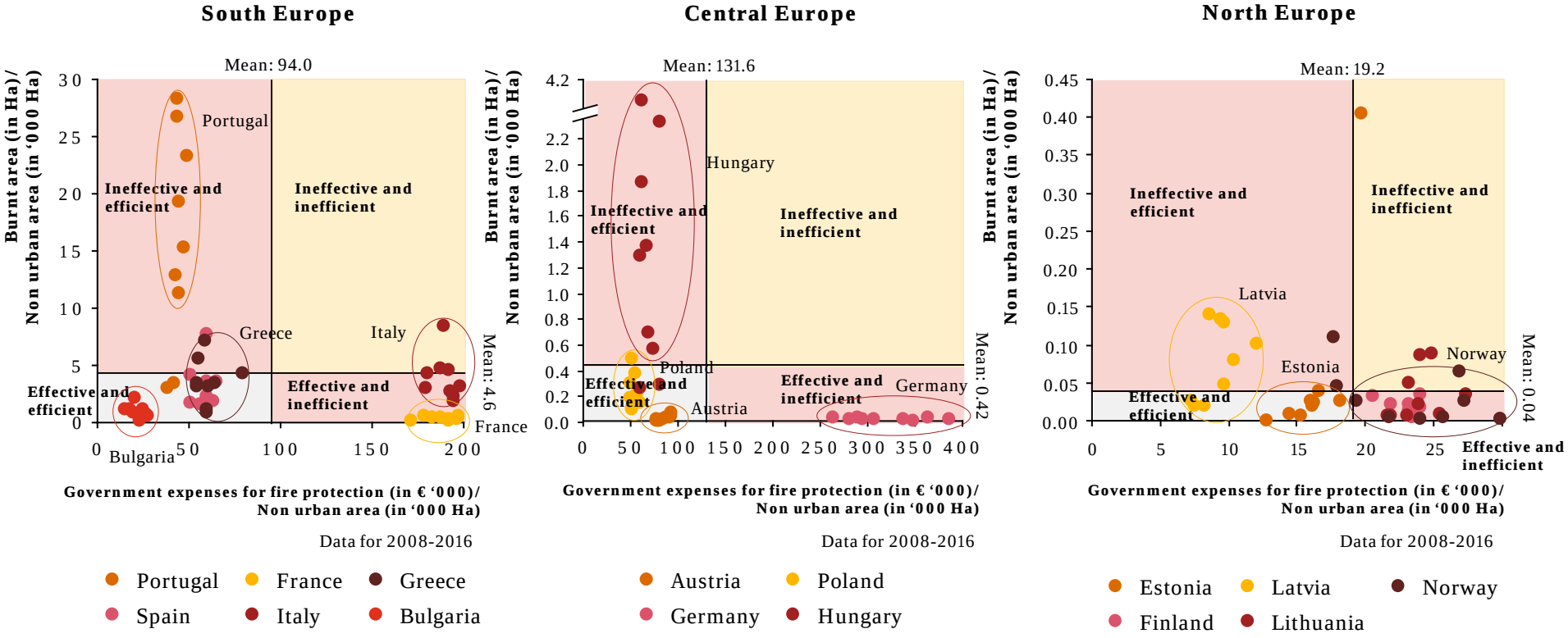








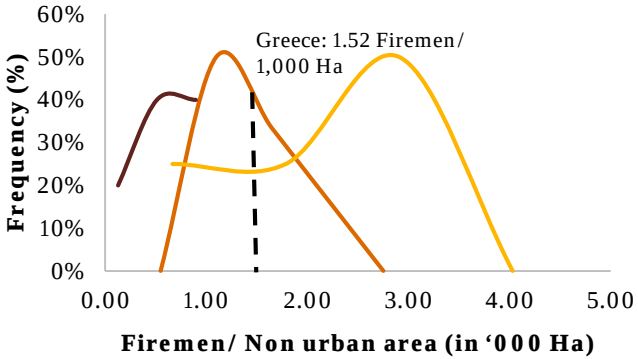
Greece's fire protection spending per hectare is relatively low and its record of burnt area is close to Italy. Bulgaria qualifies as the most effective and efficient South EU country in fire protection

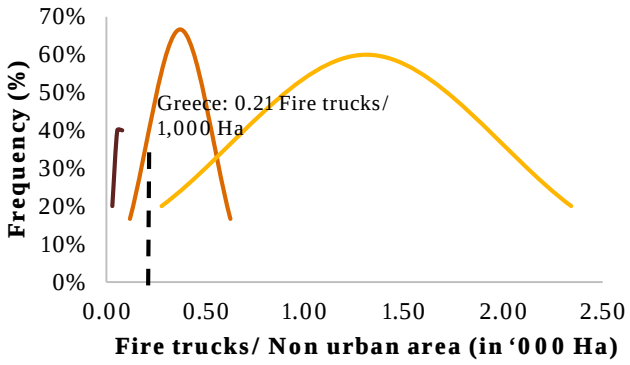


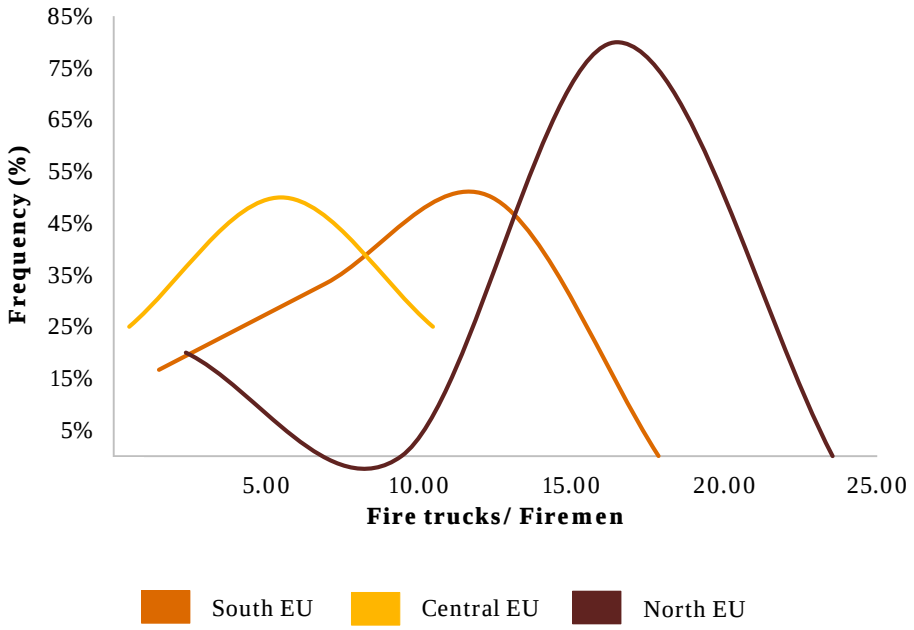
- South EU countries **suffer 10 times more** than Central EU countries which in turn suffer 10 times more than North EU countries in terms of area burnt per 1,000 Ha of non urban land
- At the same level of spending, countries exhibit different performances in fire protection depending on the country's location
- **Bulgaria, Austria, Poland and Estonia** are both effective and efficient in their fire protection. Germany, France, Norway and Italy appear to overspend for what they achieve in terms of burnt area

The amount and type of resources employed appears to vary significantly between countries

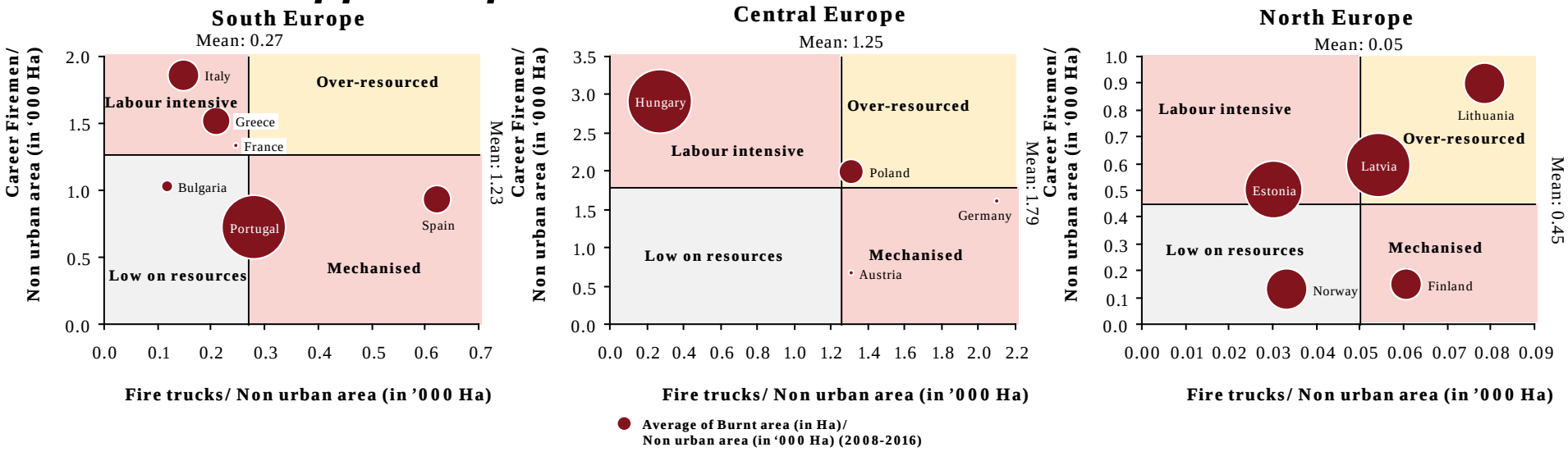
- **Greece's number of professional firemen are at the top 25% percentile of all countries**
- Greece uses about 20% less firemen per 1,000 Ha than the average of Central EU countries
- The total number of personnel available for firefighting in Greece is higher than the average of its peers, but the **mechanical means lag behind the average and are far behind than those used in Central Europe**
- Central EU countries have more firemen and mechanical resources available per non urban hectare than either South or North EU
- **Top on the engagement of firefighters is Hungary and on the employment of technical resources are Germany and Austria by a wide margin**





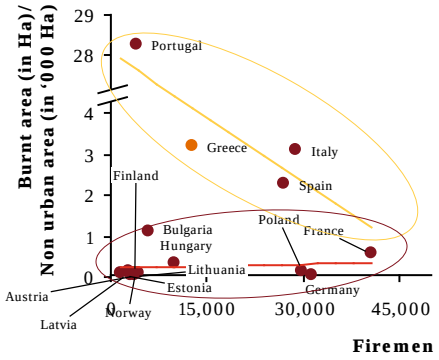


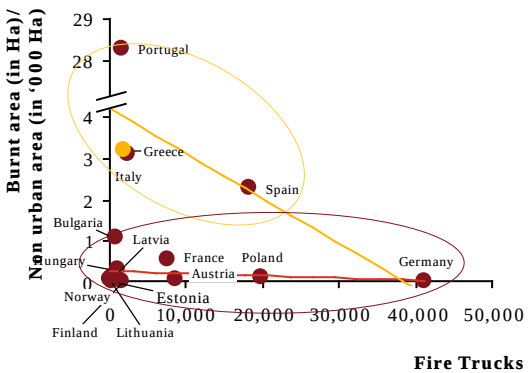
The quantity and mix of resources has a bearing on the outcome of forest fires



ln(Burnt area/ Non urban area)= c + b1*ln(Average summer temperature) + b2*ln(Average summer rainfall) + b3*ln(Firemen/ Non urban area) + b4*ln(Fire trucks/ Non urban area) + b5*Elections

Variables	Coefficients	t-stat
Intercept	-48.727	-2.413
ln(Average summer temperature in °C)	16.269	3.119
ln(Average summer rainfall in mm)	-0.103	-0.062
ln(Firemen/Non urban area in '000 Ha)	-2.398	-1.962
ln(Fire trucks/Non urban area in '000 Ha)	-0.106	-0.249
Elections	-1.604	-1.418
15 countries		R^2=0.684





- **Mechanised countries** appear to be doing relatively better to contain fires than those depending mainly on human labour
- **Greece has a labour intensive** fire protection apparatus and suffers relatively significant damages, almost at par with Italy
- Bulgaria and Norway appear to be under-resourced with Portugal on the border line. Nonetheless, Bulgaria has a very small impact from forest fires
- **Central European countries appear to be over-resourced in fire protection**

Greece is partially under-resourced in mechanical firefighting means, and overall ineffective in fire protection

- Greece is spending below the average amongst Southern EU countries for overall fire protection per 1,000 Ha of non urban land
- The quantity and mix of resources appears to have a bearing on the effect of fires, with mechanised fire protection achieving more
- The firefighting apparatus of the Central EU countries is mechanized and effective and by and large efficient
- South EU countries have a significantly smaller amount of firefighting resources compared to Central EU countries and on average suffer from the most burnt area
- Greece is low relatively to its peers in terms of effectiveness with a less mechanised fire protection apparatus; Bulgaria emerges as the most effective and efficient country in that respect

Managing fire protection

Climatic differences is the largest single determining factor of the frequency of forest fires but not of their extent

Using data for 15 EU countries over the period 2008-2016, we statistically explored the relationship of the **fire incidents with the size of non urban land to be protected, climate, government spending on fire protection and political events**

ln(Number of forest fires/ Non urban area)= b1*ln(Non urban area) + b2*ln(Average summer temperature) + b3*ln(Average summer rainfall) + b4*ln(Government Expenses/ Non urban area) + b5*Elections

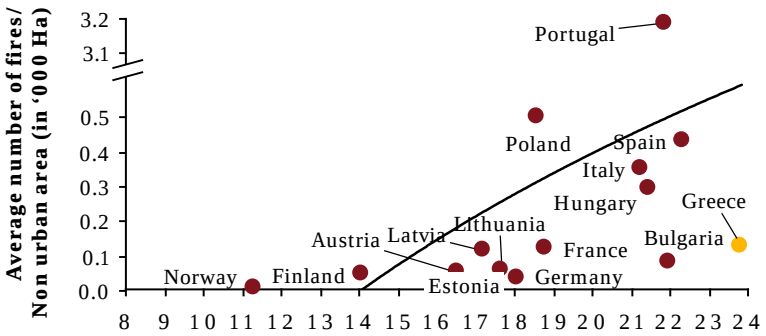
Variables	Coefficients	t-stat
ln(Non urban area (in '000 Ha)	-0.390	-3.573
ln(Average summer temperature in °C)	1.821	6.173
ln(Average summer rainfall in mm)	-1.408	-9.749
ln(Government Expenses for fire protection (in € '000)/ Non urban Area (in '000 Ha))	0.426	3.545
Elections	0.046	0.203
15 countries		R^2=0.835

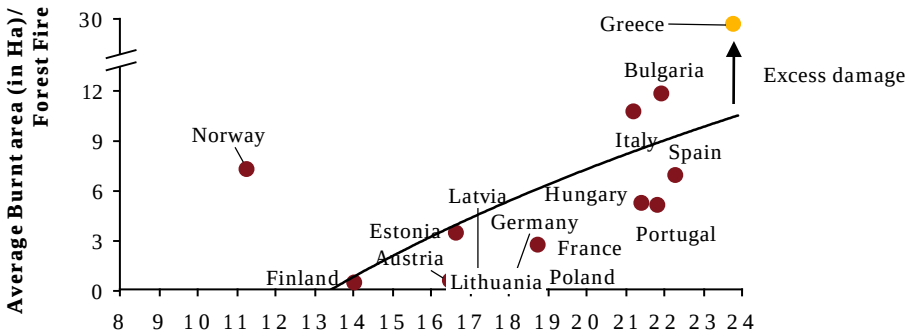
ln(Burnt area (in Ha)/Number of forest fires)= b1*ln(Non urban area) + b2*ln(Average summer temperature) + b3*ln(Average summer rainfall) + b4*ln(Government Expenses/ Non urban area) + b5*Elections

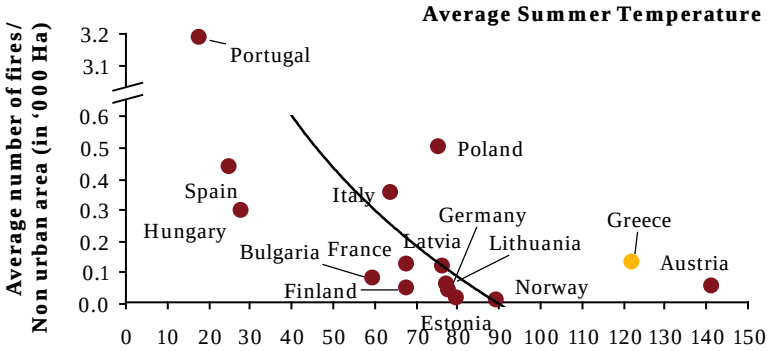
Variables	Coefficients	t-stat
ln(Non urban area (in '000 Ha)	0.055	0.454
ln(Average summer temperature in °C)	1.473	4.497
ln(Average summer rainfall in mm)	-1.013	-6.314
ln(Government Expenses for fire protection (in € '000)/ Non urban Area (in '000 Ha))	0.025	0.190
Elections	-0.246	-0.968
15 countries		R^2=0.413

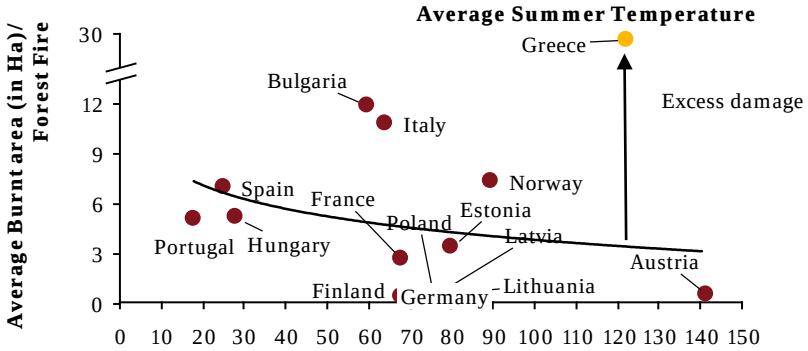
- **The frequency** of forest fires is **very sensitive to climatic conditions,** but the extent of the fire far less so
- The **size of the non urban** area affects negatively the frequency of fires, possibly because **the largest the area the less densely populated it will be,** at least in certain places, and thus less prone to accidental fires
- **Government spending** on fire protection appears to be trailing events. It is not statistically significant in determining the fire's extent. It increases systematically but with a time lag, vis a vis the fire incidents and thus it cannot curtail the frequency of fires
- **Elections and political events do not appear to have any significant effect on fire incidents,** but appear to be associated with less fire damage
- There are definitely other factors in play across EU countries, related to organization, resource deployment, systems and management and which could account for 16.5% of the fire frequency but almost 60% of the ensuing fire damage

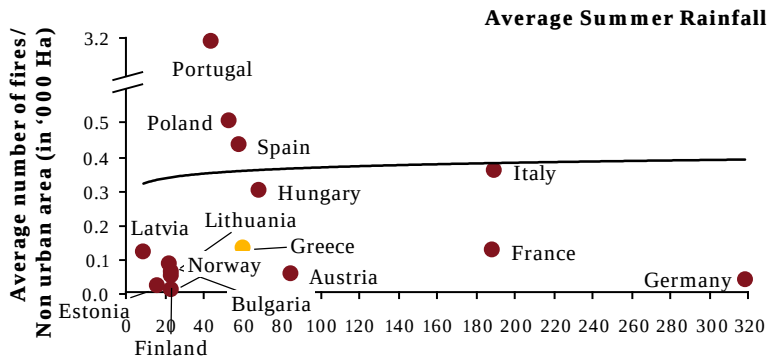
Greece suffers more fire damage than its climatic conditions and government spending would imply

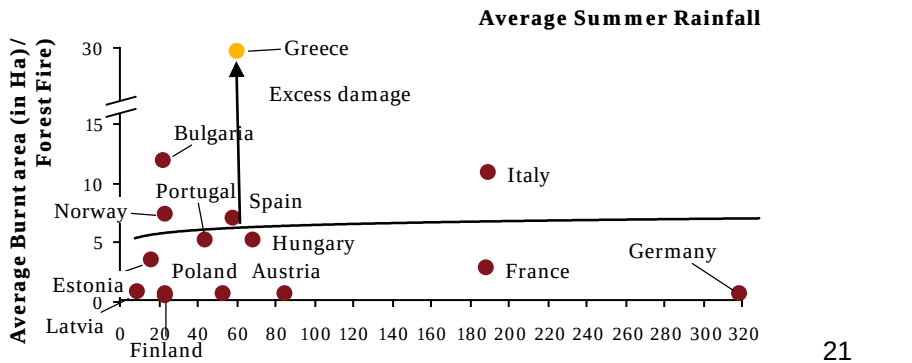








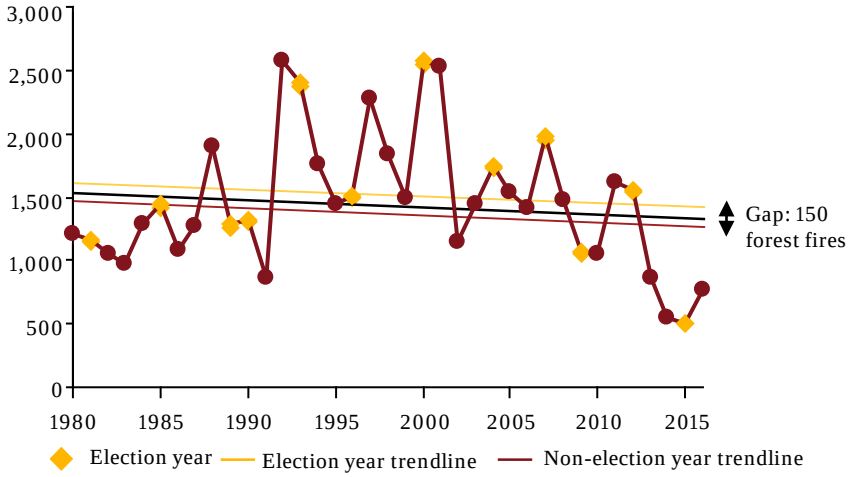




There are strong indications that political events severely affect the effectiveness of firefighting in Greece

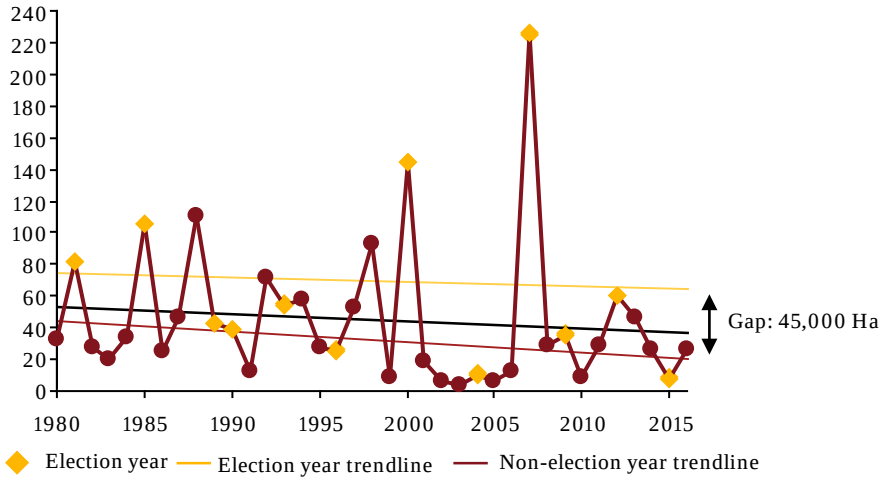
- Academic research (N. Christodoulakis, S. Skouras, "Electoral misgovernance cycles: evidence from wildfires and tax evasion in Greece", 2012) suggests that political events and elections have an impact on the number of fires and their extent
- Using European Commission data since 1980, the average number of fire incidents does not differ statistically significantly between election and non election years
- **The burnt areas differ statistically (about 45,000 Ha p.a.) between election and non election years.** Even if the 2007 hugely catastrophic fires are excluded, still the election years' damage is statistically higher than the non-election years

Number of forest fires and elections in Greece; 1980-2016



Source: European Commission (European Forest Fire Information System)

Burnt area (in Ha) and elections in Greece; 1980-2016



Source: European Commission (European Forest Fire Information System)

- The impact difference can be attributed to the "relaxation" of the firefighting mechanism in the pre and immediate post election period
- There is a very modest declining trend both on fire incidents and areas burnt which possibly goes along the decline in the size of non urban land. Interestingly, the trend for election years is almost negligible

There is strong statistical evidence that climate is in Greece the major determinant of fire incidents and their extent, but the latter cannot be extensively explained

- In Greece, climate determines in the main **the frequency of fires** and to a lesser extent **the resulting damage**
- **Elections** have no statistical impact on the frequency of fires, but are significant in determining **the extent of the fire damages**, adding about **16 hectares to each fire** or on average **24,000 hectares on election year**
- The statistical fuzziness of the extent of the fires in Greece, where structured variables explain less than 60% of it, suggests that the management and the resources deployed of fire fighting are a significant factor in determining the outcome

Time series for Greece, data for the period 1980-2016:

Number of forest fires/ Non urban area= b1*Average summer temperature + b2Average rainfall + b3Elections

Variables	Coefficients	t-stat
Average summer temperature (in °C)	0.011	10.068
Average summer rainfall in mm	-0.003	-3.572
Elections	-0.005	-0.259
		R^2=0.919

Time series for Greece, data for the period 1980-2016:

Burnt area/ Number of forest fires= b1*Average summer temperature + b2Average rainfall + b3Elections

Variables	Coefficients	t-stat
Average summer temperature (in °C)	1.374	3.248
Average summer rainfall in mm	-0.303	-0.869
Elections	16.052	2.011
		R^2=0.692

Time series for Greece, data for the period 2001-2016:

Number of forest fires/ Non urban area= b1*Average summer temperature + b2Average rainfall + b3*Government expenditure + b4*Elections

Variables	Coefficients	t-stat
Average summer temperature (in °C)	0,016	3,558
Average summer rainfall in mm	-0,003	-2,289
Government expenses (in € ‘ooo)/ Non urban area (in ‘000 Ha)	-0,002	-1,173
Elections	0,013	0,373
		R^2=0.929

Time series for Greece, data for the period 2001-2016:

Burnt area (in Ha)/ Number of forest fires= b1*Average summer temperature + b2Average rainfall + b3Elections

Variables	Coefficients	t-stat
Average summer temperature (in °C)	-0,887	-0,375
Average summer rainfall in mm	0,057	0,083
Government expenses (in € ‘ooo)/ Non urban area (in ‘000 Ha)	0,698	0,660
Elections	15,446	0,807
		R^2=0.565

A new fire protection policy framework

Greece stands out as non effective in terms of fire protection, and leaves a lot to be desired by its citizens

- **Greece does not suffer from more fires than the climate and the fire protection resources** systematically committed will warrant, but the fires cause disproportionate damage
- **Three reasons** emerge from the data analysis to explain this:
  - **poor organization, monitoring and coordination of firefighting**
  - **weak firefighting mechanism in terms of mechanised resources**
  - **political "relaxation" of the firefighting apparatus in election years**
- The **human resources available appear adequate** but their deployment and application is ineffective and they **are accompanied by less mechanical resources than necessary**
- The key underlying problem is **very weak overall management of fire protection**, reflecting itself both on the structuring of the resources and their operational effectiveness
- The revisiting of the whole nexus of issues of adequate and appropriate resources, optimally deployed is deemed necessary

Fire protection approaches in effective and efficient EU countries

- There are three common features in the way benchmark countries (France, Germany, Spain, Austria, Bulgaria) **approach effective and efficient fire protection**:
  - **fire protection is autonomously organised at the level of administration region with a single operational command structure at that level along with a national one**
  - **they all have installed central and regional fire protection monitoring and coordination systems with full country coverage**
  - **they are extensively mechanized for ground firefighting**
- Most countries **use state of the art fire simulation systems**, which employ past data, current meteorological data and can be augmented by live on the ground information
- The four most successful countries (France, Germany, Spain, Austria, Bulgaria) are spending on average **€ 152k per 1,000 hectares of non urban land, against €62k for Greece,** indicating the need for extra funding of fire protection

To reduce the extent of the fires, there is a need to establish a new set of policies and rules

- **Prevention**
  - creation a centre of excellence for fire protection
  - adoption of fire simulation models to predict the course and velocity of the fire
  - emphasis on remote monitoring along with physical patrolling of non urban areas
  - mobile phone and social media system to report fires and disseminate information
- **Firefighting**
  - improvement of the operational capabilities in order to deal with each fire in the first critical minutes which can be achieved through:
    - installing surveillance and early warning systems in high risk areas
    - upgrading the fleet of firefighting aircraft
    - increasing the fire truck fleet
  - unified command at the level of fire incident to improve the speed of reaction
  - improvement of the cooperation and communication of all the responsible bodies for handling fire protection by streamlining communications and decision making
  - rational use of reserve resources to ensure critical mass at any fire incident
  - optimal distribution of permanent firefighting resources in non urban areas
  - drafting of new, complete and implementable evacuation plans for semi-urban areas
  - properly and systematically selected and trained reserve firefighters, fully integrated in the operational command structure
- **Structural**
  - single firefighting force at the regional level independent of local authorities and fully empowered to save life and property
  - single national fire protection monitoring and coordination centre linked with equivalent regional ones
  - increased spending on fire protection by 50% over the next five years and focus on state of the art monitoring and prevention and on the upgrading of the mechanical resources
  - make fire insurance compulsory in urban and semi urban areas
  - rent forest and non urban land for mild productive uses with fire prevention as compensation

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Appendix

Appendix (data for 2016)

	Greece	France	Italy	Portugal	Spain	Austria	Bulgaria	Estonia	Finland	Germany	Hungary	Latvia	Lithuania	Norway	Poland
Number of fires	777	4,285	4,793	13,261	8,817	317	584	84	933	608	452	641	98	345	5,286
Burnt Area (in Ha)	26,539.5	16,093	47,926	161,522	65,817	398	6,340	123	310	283	974	467	26	1,884	1,451
Career Firemen	12,673	40,646	28,870	4,100	26,998	4,340	6,011	1,582	3,695	31,308	10,075	2,711	2,992	3,718	29,907
Seasonal Firemen/ Volunteers	2,867	193,800	20,060	45,000	105,947	259,103	2,639	1,959	15,012	996,688	19,030	76	1,258	8,152	259,519
Total Firemen	15,540	234,446	48,930	49,100	132,945	263,443	8,650	3,541	18,707	1,027,996	29,105	2,787	4,250	11,870	289,426
Fire Trucks	1,772	7,542	2,330	1,600	18.187	8,540	692	96	1,562	41,216	964	249	263	963	19,800
Government expenditure for fire protection services (in €mn)	510	6,040	3,079	251.1	1,738	608.3	145.9	52.3	594	7,591	281.4	55.3	85	781.3	784.4
Government expenditure for fire protection services (in €mn)/ Non urban area (in '000 Ha)	61.01	197.68	197.77	43.98	59.64	93.49	24.98	16.57	23.13	386.49	81.26	12.05	25.49	26.94	52.05

Source: European Commission (European Forest Fire Information System), CTIF, Eurostat, FAO; (data 2016)

Appendix (data for 2016)

	Greece	France	Italy	Portugal	Spain	Austria	Bulgaria	Estonia	Finland	Germany	Hungary	Latvia	Lithuania	Norway	Poland
Total area (in '000 Ha)	13,169.4	63,810.8	30,207.3	9,222.7	50,598.3	8,387.8	11,099.6	4,533.6	33,844.1	35,756.8	9,301.2	6,458.6	6,528.4	32,338.1	31,192.8
Non-urban area (in'000 Ha)	8,116.1	30,335.4	14,927.7	5,678.2	28,651.8	6,307.4	5,785.5	3,154.3	25,652.3	19,629.2	3,461.8	4,590.2	3,333.3	25,359.7	15,066.3
Tree-covered area (in '000 Ha)	3,393.8	1,5342.2	9,216.9	2,991.8	13,189.1	4,156.7	4,394.9	2,519.1	2,3285.5	11,459.7	1,995.6	3,504.6	2,264.6	13,986.6	10,376.4
Shrub-covered areas (in '000 Ha)	3,204.2	2,783.6	1,981.6	1,382.1	6,756.3	379.3	569.7	188.1	948.8	1,563.0	377.8	285.7	341.0	1,840.0	1,415.7
Grassland (in '000 Ha)	1,447.8	11,952.9	3,487.2	1,293.9	7,760.2	1,655.0	807.9	444.8	940.0	6,584.3	1,086.8	799.9	727.7	3,176.1	3,265.1
Sparsely natural vegetated areas (in '000 Ha)	70.4	256.7	242.0	10.4	946.3	116.4	13.1	2.3	478.1	22.1	1.5	0.0	0.0	6,357.0	9.2
Population (in '000)	10,768.1	66,989.0	60,589.4	10,309.5	46,528.0	8,772.8	7,101.8	1,315.6	5,503.2	82,521.6	9,797.5	1,950.1	2,847.9	5,258.3	37,972.9
Non-urban population (in '000)	3,431.4	20,742.6	5,785.3	3,222.6	1,600.1	3,552.4	924.3	588.0	2,196.4	12,965.6	1,852.8	427.2	243.9	1,500.7	13,274.2
Average temperature during summer (in °C)	23.8	18.8	21.3	21.7	22.1	16.1	21.5	16.6	14.2	17.9	20.9	17.0	17.4	11.2	18.2
Average summer rainfall (in mm)	22.0	65.4	62.6	17.5	14.6	136.9	57.7	73.4	66.2	77.6	69.8	71.6	72.7	87.3	73.5

Source: Eurostat, World Bank, FAO

Appendix

Countries	Averages for the period 2008-2017		Data for 2017		Data for 2016	
	Number of forest fires / Non urban land (in '000 Ha)	Burnt Forest Area (in Ha) / Number of forest fires	Burnt Forest Area (in Ha) / Number of forest fires	Career firemen / Non urban area (in '000Ha)	Total firemen / Non urban area (in '000Ha)	Number of fire trucks / Non urban area (in '000Ha)
South EU	**0.73**	**11.42**	**13.90**	**1.23**	**4.55**	**0.27**
Portugal	3.24	7.15	25.74	0.72	8.60	0.28
Spain	0.44	7.52	12.92	0.93	4.56	0.62
Italy	0.37	11.40	17.45	1.85	3.14	0.15
Greece	0.13	27.94	12.37	1.52	1.86	0.21
France	0.12	3.00	5.99	1.33	7.67	0.25
Bulgaria	0.08	11.51	8.91	1.03	1.48	0.12
Central EU	**0.22**	**1.57**	**1.18**	**1.79**	**30.11**	**1.25**
Poland	0.48	0.42	0.28	1.98	19.21	1.31
Hungary	0.31	4.95	3.39	2.91	8.41	0.28
Austria	0.05	0.41	0.11	0.67	40.49	1.31
Germany	0.04	0.49	0.93	1.59	52.34	2.10
North EU	**0.04**	**2.29**	**0.87**	**0.45**	**0.83**	**0.05**
Latvia	0.11	0.61	0.63	0.59	0.61	0.05
Lithuania	0.05	0.60	0.66	0.90	1.27	0.08
Finland	0.04	0.40	0.52	0.13	0.73	0.06
Estonia	0.02	3.09	0.54	0.50	1.12	0.03
Norway	0.00	6.74	1.99	0.13	0.41	0.03
Sample Average	**0.37**	**5.75**	**6.16**	**1.12**	**10.13**	**0.46**

Source: European Commission (European Forest Fire Information System), FAO, CTIF

Data for Greece

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of fires	2,535	1,141	1,452	1,748	1,544	1,417	1,983	1,481	1,063	1,052	1,613	1,559	862	552	510	777
Burnt Area (in Ha)	18,221	6,013	3,517	10,267	6,437	12,661	225,734	29,152	35,342	8,967	29,144	59,924	46,676	25,846	7,095,75	26,539.5
Non urban area (in '000 Ha)	8,057.3	8,057.9	8,070.6	8,074.3	8,075.7	8,082.9	8,087.7	8,104.5	8,111.6	8,113.5	8,114.5	8,114.6	8,115.0	8,116.0	8,116.1	8,116.1
Average summer temperature (in °C)	23.9	23.7	24.5	22.9	23.0	23.3	24.6	24.1	23.6	23.9	23.6	25.0	23.9	23.1	23.4	23.5
Average summer rainfall (in mm)	16.1	36.9	18.7	23.7	26.8	32.2	22.8	20.2	28.1	24.6	13.8	9.5	27.9	35.2	35.0	58.2
Government expenditure for fire protection services (in €mn)	363	385	402	450	440	436	531	536	663	503	456	491	460	455	502	510
Number of fires/ Non urban area (in '000 Ha)	0.31	0.14	0.18	0.22	0.19	0.18	0.25	0.18	0.13	0.13	0.20	0.19	0.11	0.07	0.06	0.10
Burnt area per fire (in Ha)	7.19	5.27	2.42	5.87	4.17	8.94	113.83	19.68	33.25	8.52	18.07	38.44	54.15	46.82	13.91	34.16
Burnt area (in Ha)/ Non urban area (in '000 Ha)	2.26	0.75	0.44	1.27	0.80	1.57	27.91	3.60	4.36	1.11	3.59	7.38	5.75	3.18	0.87	3.27
Government expenditure for fire protection services (in €mn)/ Non urban area (in '000 Ha)	45.05	47.78	49.81	55.73	54.48	53.94	65.66	66.14	81.74	62.00	56.20	60.51	56.69	56.06	61.85	62.84

Source: European Commission (European Forest Fire Information System), CTIF, Eurostat, FAO