

Report No 4

# Forest Fires in Europe

## 2003 fire campaign

 EUROPEAN COMMISSION  
DIRECTORATE-GENERAL  
Joint Research Centre

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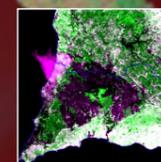
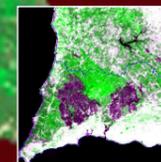
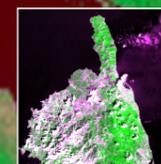
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## 2003 fire campaign

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#### MEMBER STATES AND CANDIDATE COUNTRIES

Sources for data and comments are cited in the text.

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Forest Fires in Europe - 2003 fire campaign -  
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## **1. A NEW LEGAL FRAMEWORK FOR FOREST PREVENTION IN THE EUROPEAN UNION**

### **1.1. Council Regulation (EEC) No 2158/92**

The European Union (EU) recognised a long time ago that forests can be severely damaged by the effects of forest fires, especially in the south of the EU. Although the main responsibility for co-ordination and implementation of any forest policy is at Member State level, the Community decided to help the Member States in their efforts against forest fires.

Concerning prevention, a Community scheme to develop activities co-ordinated at EU level was established by Council Regulation (EEC) No 2158/92 of 23 July 1992, on the protection of the Community's forests against fire. It aimed to provide increased protection for forests, in particular to step up efforts undertaken to maintain and monitor forest ecosystems and to safeguard the various functions which forests fulfil for the benefit of rural areas.

The main purpose of the scheme was the reduction of the number of forest fire outbreaks and the extent of areas burnt. In order to concentrate efforts in the most critic zones the scheme required a classification by Member States of their territory according to high, medium and low forest fire risk areas: in total some 60 million hectares of forests - more than 50% of the EU 15 forests - were classified as high or medium forest fire risk areas. The scheme was implemented by single projects in the first phase (1992-1999) and national programmes later (2000-2002), established according to national and regional forest protection plans prepared by Member States for the areas classified as being of medium and high risk.

Furthermore, a database on all forest fires - usually know as the "common core database" - was established in 1994 in order to collect information on forest fire occurrence and their causes. This database has become a relevant part of the European Forest Fire Information System (EFFIS) developed by the Joint Research Centre (JRC) under the Community Action Plan for Civil Protection and which is intended to improve the understanding of forest fires and to contribute to their prevention. The Community supported forest fire prevention measures in 5 Mediterranean Countries with a yearly EU funding of about 10 million EURO. Globally the scheme provided a significant co-financing (123,7 million EURO for the period 1992-2002) for preventive measures implemented by Member States, contributed to identify causes and problems related to forest fires and helped to reduce the average size of the fires and the duration of single fires. About 50% of these funds were used for creating or improving prevention infrastructures (water points, forest roads, silvicultural investments), 30% for surveillance equipment, 16% for awareness-raising and information campaigns as well as specialised training and about 4% for analytical studies and the development of geographical information systems.

The scheme set up by the Council Regulation (EEC) No 2158/92 ran for 11 years and expired on 31 December 2002. Measures co-financed from this Regulation, such as the common core database, studies and analyses on forest fires, awareness-raising campaigns, training and preventive measures, have been included in a new Regulation known as "Forest Focus". In addition, infrastructure investments for forest fire prevention, whereas not included in this new Regulation, and some measures related to forest restoration after fire will continue to be ensured within the rural development programmes established by Council Regulation (EC) No1257/99.

### **1.2. Council and European Parliament Regulation (EC) No2152/2003 (Forest Focus).**

The spirit of the Regulation (EEC) No2158/92 and the EU co-funding of measures to prevent forest fires has been taken over by a new Community scheme for the period 2003-2006.

On 15 July 2002 the European Commission submitted a proposal for a new Regulation aiming to continue the previous measures contributing to the protection of forests by the most relevant menaces, atmospheric pollution and fires. After long discussions and negotiations this proposal has been adopted during the year 2003 and became the Regulation (EC) No 2152/2003 of European Parliament and

Council of 17 November 2003 concerning monitoring of forests and environmental interactions in the Community ("Forest Focus").

Forest Focus has an integrated approach and aims to establish a new Community scheme for the monitoring of forests and environmental interactions in order to protect the Community's forests. It builds on the results achieved by two previous schemes in relation with the effects of atmospheric pollution and fires on forest and aims to continue and further develop the protection and monitoring of forests and the awareness of the importance of forests for the environment.

From a general perspective, the Forest Focus scheme is based on four main pillars:

1. Monitoring of atmospheric pollution effects on forests (Level I and II networks);
2. Forest fire monitoring and collection of data on forest fires (common core database);
3. Forest fire protection established also through the implementation of preventive measures (complementary to those supported by the Rural Development Regulation);
4. Studies to develop the scheme mainly in relation with new environmental issues such as biodiversity, soil and climate change.

Concerning the specific matter of forest fire prevention, the scheme would allow developing:

- The European Forest Fires Information System (EFFIS) whose main components are the "common core database", the European Forest Fires Risk Forecast System (EFFRFS) and the European Forest Fire Damage Assessment System (EFFDAS), all managed by JRC;
- Forest fires prevention measures (mainly infrastructures and only whereas not co-financed by the Rural Development Regulation);
- Studies (proposed by different Member States and/or the Commission).

The scheme will run for the period 2003 - 2006, with a total budget for co-funding of 61 million EURO: the yearly budget from the year 2004 will be of about 17 million Euro, with a co-financing by the Commission up to 75%. This scheme will be implemented by Member States through national programmes, drafted for the periods 2003-4 and 2005-6. It will be also open to the 10 new Member States which will draft national programs and will join the scheme in 2004.

During the year 2004 the European Commission is expected to adopt the necessary implementing regulation that provides further details for the establishment of the scheme. At the same time, preparations will start to integrate future forest monitoring activities in the framework for Community actions in the field of environment that was laid out in the Communication "Building our Common Future, Policy Challenges and Budgetary Means of the Enlarged Union 2007-2013". An informal working group on forest fire prevention (WGFFP) has been established to provide suggestions on how to further develop forest fire prevention in the EU after 2006.

## 2. FIRES AND BURNT AREA IN THE SOUTHERN STATES

### 2.1. Southern Member States (1980 – 2003)

Summer 2003 was one of the most severe fire seasons experienced during the last decades in Southern Europe, although the greatest fire severity was mostly concentrated in Portugal and France. Extreme fire conditions were especially met in these two countries, where a number of major fires affected large portions of their natural environment.

Portugal experienced by far the worst forest fire season that the country has faced in the last 23 years, with a total area burned of almost 5 times the average and impressive figures on the amount of natural resources affected.

Also in France, summer 2003 has been the worst fire season of the last decade and among the worst ones of the last 24 years.

Spain and Italy were also strongly concerned, although, as a whole, still within the average conditions of last years. On the contrary Greece, although with a relatively stable number of fires, was less affected in terms of area burned.

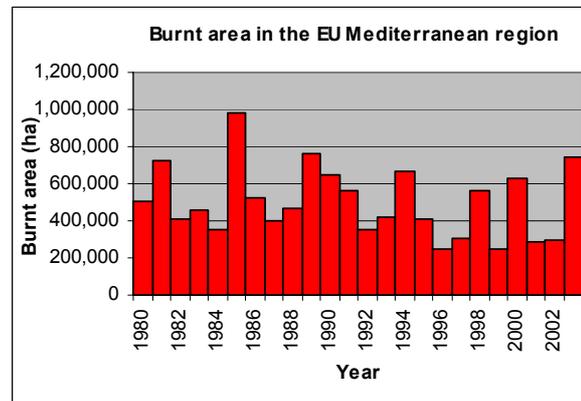
Considering the number of fires occurred, the statistics can still be regarded as within the average of last years, both taken as overall value (Figure 1b) and separated by country (Figure 2b). The area burned, on the other hand, had a remarkable increase at EU Mediterranean region level (Figure 1a) which was mostly due to the severe fire season in Portugal and partially also to the one in France (Figures 2a-3a).

The 2003 fire campaign was not only exceptional in terms of damage in the most affected countries, but also in the number of casualties resulting from these fires. Over 40 people amongst civilians and fire fighters died due the 2003 summer fires.

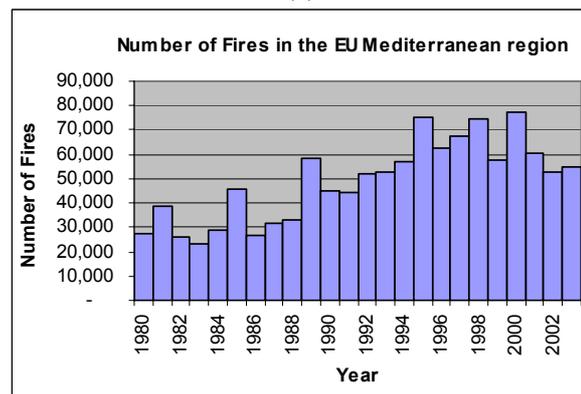
Figure 1b shows the yearly number of fires in the EU Mediterranean region since 1980. After the increasing trend in the number of fires during the period 1990-1996, the number of fires has remained steadily high until 2000. After that year the fire frequency has returned to the average statistics of the beginning of the '90, and the year 2003 has confirmed the more recent trends.

Figure 1a shows the total burned area per year in the EU Mediterranean region since 1980. It is evident the strong variability of the statistics from

one year to the next, which clearly indicates the strong dependency of the burned area upon seasonal meteorological conditions. After 2 years of relatively low figures (2001-2002) that had injected some optimism, in the 2003 the total area burned results to be the third largest one of the entire time series considered, and we must go back to 1989 to find a worse fire season.



(a)

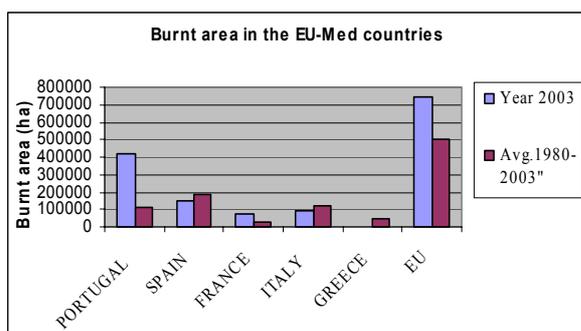


(b)

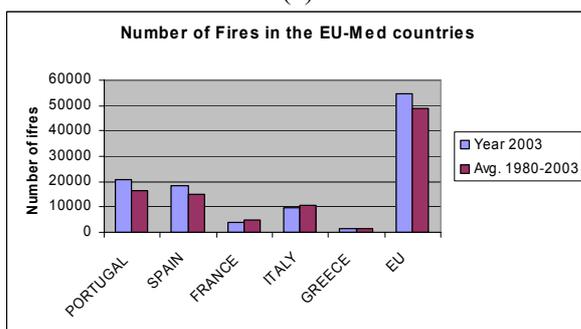
Figure 1. Burnt area (a) and Number of fires (b) in the EU Mediterranean region in the last 23 years.

*Provisional data provided by: Direcção Geral das Florestas, Portugal; Dirección General para la Biodiversidad, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Italy; General Secretariate for Forests and the Natural Environment, Greece.*

Figure 2a compares the yearly average burnt area and number of fires for the period 1980 to 2003 with the values of 2003. This comparison is performed for each Member State and for the overall EU Mediterranean countries. Figure 2a shows that the burnt area in the year 2003 was above the average for the last 24 years only in Portugal and France. However, the overall figure for the EU Mediterranean region is well above the average for the last 24 years.



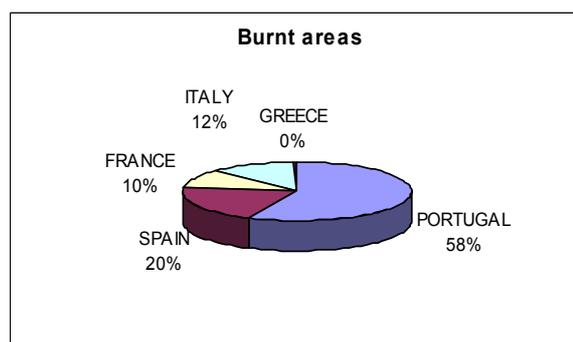
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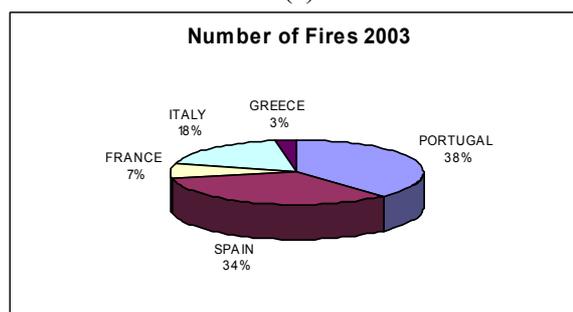
(b)

Figure 2. Burnt area and number of fires in the EU Mediterranean countries in the year 2002 as compared to average values for the last 23 years.

As in previous reports, a comparison of the contribution of each Member State, in terms of number of fires and burned area, to the overall figures in EU Mediterranean region is presented in Figures 3a and 3b.



(a)



(b)

Figure 3. Percentage of the total burnt area and the total number of fires of EU Mediterranean region in each of the Southern Member State.

A summary of the number of fires in the last 24 years, the average for the last two decades, and the figures for the year 2003 are presented in Table 1, which shows also the corresponding figures for the burnt areas in the different periods.

Table 1. Number of fires and burnt area in the Member States and the European Union in the last decades

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2003	20864	18628	4100	9697	1452	54741
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5489	11352	1748	58991
Average 1980-2003	16612	14965	4945	10887	1576	48985
TOTAL	398682	359157	118690	261290	37822	1175641
Percentage of total	38.1	34.0	7.5	17.7	2.7	100

Burnt Area (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
2003	421835	149224	74000	91803	3397	740379
Yearly Average(1980-1989)	74486	244788	39157	148485	52417	559331
Yearly Average(1990-1999)	102203	161323	23024	108890	44108	442529
Yearly Average 1980-2003	107704	190519	31557	120725	47418	499164
TOTAL	2584895	4572462	757358	2897396	1138031	11979948
Percentage of total (2003)	57.0	20.2	10.0	12.3	0.5	100

A total of 740,379 ha were burnt in the EU Mediterranean region in 2003. This figure is well above the average for the last 24 years (499,164 ha). The number of fires in the region during 2003

was 54,741. This figure is still above the average for the last 24 years (48,985), but below the average for the decade 1990-99 (58,991).

Since the area of each country is different, and the area at risk within each country is also different, these comparisons cannot be done in absolute terms. During 2003, about 72 % of the fires took place in Spain and Portugal, resulting in approximately 77% of the total burnt area in the EU Mediterranean region. Different conditions in the Eastern part of the EU Mediterranean region helped to maintain a lower number of fires and burnt areas in Italy and Greece. As mentioned in previous bulletins, it is foreseen to use the fire severity index instead of just the extent of burnt areas to establish objective comparisons among countries.

During the last three years, the previous tendency of the EU Mediterranean region towards increasing the number of fires seems to be stabilized. This factor may possibly be explained by the effect of the public information campaigns carried out in all the countries and the improvement in prevention and fire-fighting capacity of the EU Mediterranean member states. Nevertheless adverse meteorological conditions can always happen, and the area burnt can have sudden dramatic increase in severe fire seasons, as it was the case in 2003. The fight against forest fires has to take into account such a strong year by year variability of the phenomenon.

## 2.2. Portugal

Portugal faced in 2003, the worst fire season ever recorded. There were 4,645 fires, and 16,219 small fires (area < 1 ha) that were responsible for 421,835 ha of burned forest land. From this burned area 67 % corresponds to forest (283,836 ha) representing **8.6%** of the total Portuguese<sup>1</sup> forest. They were also 44,876 ha of burned agriculture areas.

The largest burned area occurred in the districts of Castelo Branco and Portalegre where a total of 183.303 ha of were burnt (including agriculture areas), 69 % (126.589 ha) of those on forest. The districts of Santarém and Faro were also very affected with a total of 132.588 ha. There were 88 fires larger than 500 ha, responsible for 86 % (357.790 ha) of the total forestland burned.

Like in previous years the higher number of fires took place in the districts of Porto and Braga, in the Northern Region of Portugal. This region is

<sup>1</sup> 3.3 million ha of forest - based on the 1995 National Forest Inventory – 3<sup>o</sup> rd Revision, 1999.

characterised by a large density of population on the forestland, associated with a small dimension of the property.

In terms of the monthly distribution the year of 2003 was characterised by a remarkable concentration of burned area in August, where 66 % of total burned area took place. It was also in this month that the highest number of fires was registered.

Due to very unfavourable meteorological conditions, with very high values of temperature and low values of humidity, associated with a strong lightning activity in 1 and 2 of August, the period between 27<sup>th</sup> of July and 4<sup>th</sup> of August was very critical. Associated to the fires that were already active several other started, caused by this lightning activity.

In these 9 days the fires that took place were responsible for 281.047 ha of burnt area representing 60 % of the total area. This percentage represents **2.7 times more than the ten-year average** (104.118 ha). From the 85 fires larger than 500 ha, 40 took place in this period and 16 where caused by lightning.

These large fires were concentrated in the center of the country, in both margins of the Tejo river (in blue in Figure 4). In the north margin they affected large areas of Maritime Pine and in the south margin they affected areas that were mostly composed by Blue Gum and Cork Oak trees. The intensity of the fires was so high that even the natural break that the Tejo river represents was not sufficient to avoid fires to cross it.

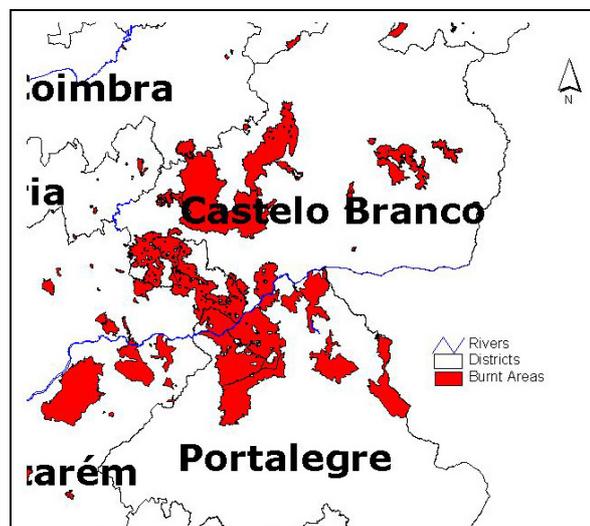


Figure 4. in the districts of Castelo Branco and Portalegre.

Another critical period occurred between 7 and 12 of August when 2 fires started in the Algarve region, in the south of the country (Figure 5). These fires burnt more than 35.745 ha of forestland. At 10 of September there was another fire between these two previous fires that burned more 25.894 ha of forestland, devastating all the Serra of Monchique.

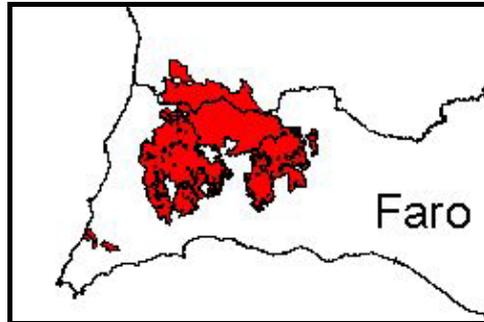


Figure 5. Fires in the district of Faro

In terms of the distribution of the forest fires larger or equal than 50 ha, used by the EFFDAS evaluation, Portugal recorded in 2003 a total of 327 fires, representing only 2% of the total number of fires, but responsible for 95% of the total burned area.

The higher number of fires occurred mostly in the districts of Guarda and Santarém, representing 32% of the total incidents. But the higher values of burned area were the districts of Castelo Branco and Portalegre. From the total burned area in these fires, 10% belongs to agriculture areas mainly located in Alentejo, in which Portalegre represents 37% of the total.

In Portugal, there were 21 deaths during 2003 fire season, 18 of them only in three weeks (between July 29 and August 14). Most of the reported deaths were located in the centre region of Portugal (districts of Castelo Branco, Portalegre and Santarém) and occurred during the critical period where several forest fires created a continuous burned area.

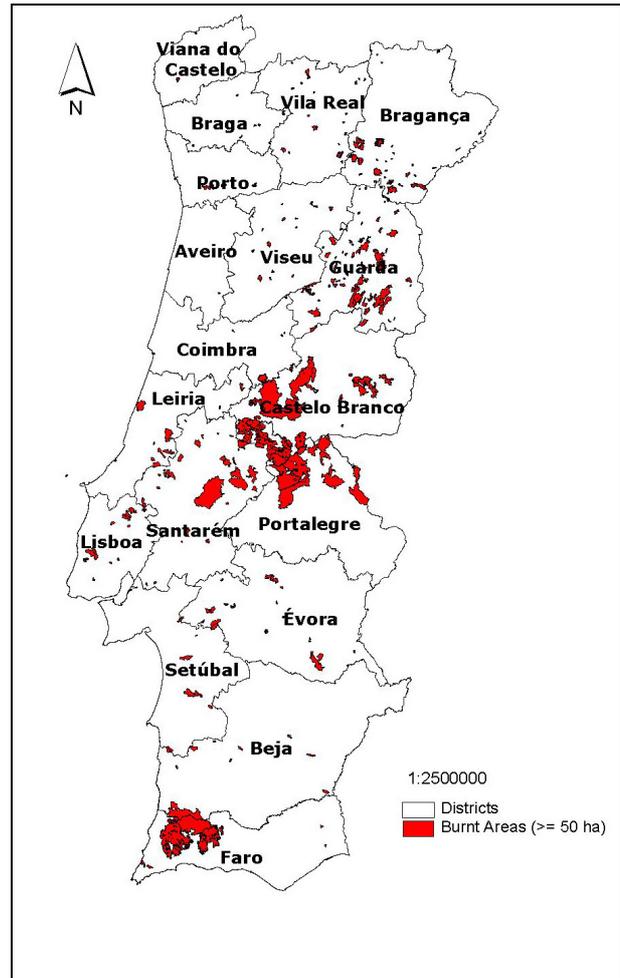
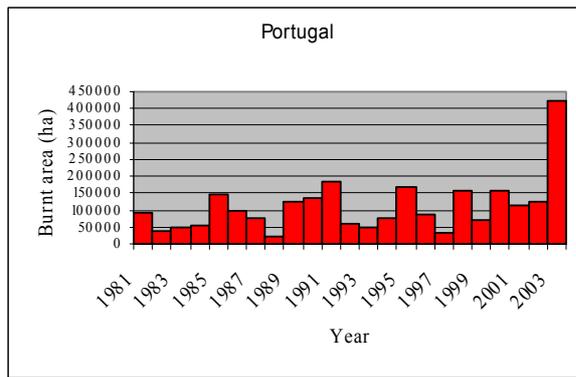
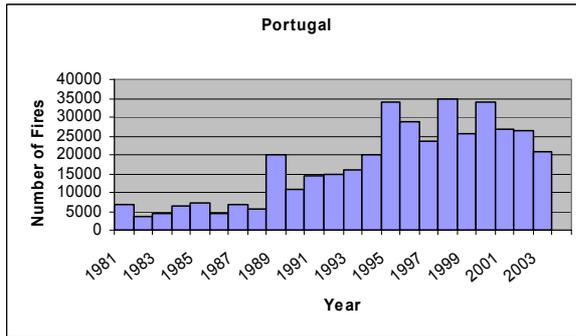


Figure 6. Distribution of forest fires ( $\geq 50$  ha) by District based on the ground survey by the National Ranger Corps

Most of the victims (17) were civilians trying to save goods or escape from fire. Also 2 fire-fighters died, one after a car-accident and other due to burns. The other two victims were forest sappers from Chile, both caught by a fire. There were also reports of more than one thousand people (mainly civilians) needing medical assistance due to smoke intoxications, burns, wounds, etc..



(a)



(b)

Figure 7. Burnt area and number of fires in Portugal in the last 23 years.

Total amount of damages has achieved a value of more than 1000 M€. Over 2.000 buildings were affected, causing almost 200 homeless. Additionally, more than two thousand km of electrical cables were destroyed, leaving over half-million people without electricity. Telephone network was also destroyed in some areas, leading to absence of communication with more than 10 thousand homes.

(Source: *Direcção-Geral das Florestas, Direcção de Serviços de Valorização do Património Florestal, Divisão de Protecção e Conservação Florestal, and National Service for Fire and Civil Protection, Natural and Technological Hazards Division*)

### 2.3. Spain

The first months of 2003 did not present high fire risk conditions. Only in February there were some days of fast inland winds in Catalonia and Castellon that provoked a fire that burnt over 500 ha in Girona.

June started with a heat wave that dried up the abundant herbaceous vegetation that grew after the Spring rains. There were numerous days with high risk in the south and east of the Spanish territory. This situation affected Galicia in the

week of 17 to 24 of June. On June 16<sup>th</sup>, the placing of the amphibian planes of the Ministry of Environment (Ministerio de Medio Ambiente MMA) over the Spanish territory was initiated. These had in this period a higher level of activity than normal. The central headquarters in Madrid received 67 request for help which resulted in 82 interventions of the amphibian planes. The largest fire in this period happened in Navas del Rey (Madrid) during June 26<sup>th</sup> and 27<sup>th</sup>. Four amphibian planes of the MMA participated for its extinction. Despite the unfavorable conditions in June, the number of forest fires and the areas affected by them were below those of the previous year and the average for the last 10 years.

July was a very hot month with very little rainfall. However, the absence of strong wind kept the level of risk as high over most of the country and it did not reach the “very high” level until the last days of the month. The number of forest fires was high, although these were extinguished quickly. Towards the end of the month, France requested help to fight the fires in the Alps Maritime and two CL-215 T were dispatched. Interventions in Portugal were also frequent with CL-215 planes in the provision of help to remediate the extremely dangerous situation in the neighbor country. On July 31<sup>st</sup> the fire in Buendia (Cuenca) started and this lasted until the 3<sup>rd</sup> of August. The areas affected by fires until the end of July were still below those of the previous year and the average for the last 10 years.

August started with extreme conditions on the south east of the Iberian Peninsula with high temperatures and unstable atmosphere that favors fire spread. Several large fires take place at the beginning of this month in Huelva, Extremadura and Castilla y Leon, with the events of Valverde del Camino and Almonaster la Real in Huelva, Valencia de Alcantara, Alcuescar, Mirabel, Nuñomoral, Marchagaz in Caceres, Solana de Avila and Cebreros in Avila, and Merindad de la Cuesta Urria in Burgos. In the second third of the month, the high fire risk levels extend to all Spain except for the North West and the region of Cantabria. Large fires take place in Agallas-Pinofranqueado (Salamanca-Caceres), Sant Llorenç de Savall (Barcelona), Macanec de la Selva (Girona), and Hervas and Hoyos (Caceres). French amphibian aircrafts (CL-415) participated in the extinction of the Sant Llorenç fire. Towards the end of the months, the Valencia Community, which had not had large fires until then, suffered

the fires of Buñol (Valencia) and Benisa (Alicante) that affected shrublands.

Fire risk in August was extreme producing 32 large fires (>500 ha) and 62% of the total burnt area in 2003. The fire risk level in Portugal remained extreme during the whole month. The aerial means of the MMA participated in the extinction of the numerous fires that occurred in the period. Additionally, the MMA means participated all over the Spanish territory (in 44 provinces) on 589 fires accumulating a total of 3932 flight hours. The area affected by forest fires up to the 31<sup>st</sup> of August was slightly above the average for the last decade.

September brought decrease in temperatures and some rain in the North of the country that reached also the Levante region later on. However fire risk in the south part of the Iberian Peninsula was still high because of the lack of rain. The largest fires occurred in Tornavacas (Caceres) and Burgohondo (Avila). The aerial means of the MMA flew a total of 1359 hours in this month. International help to other countries continued with the participation of amphibian aircrafts on fires in France on September 2<sup>nd</sup> and 3<sup>rd</sup>, and in Portugal on September 13 to the 16<sup>th</sup>, 2004. The total burned area in the country up to the end of September was slightly below the average for the last decade. Rainfall occurred during the last two days of the month, which lowered the fire risk overall.

October presented low fire incidence nearly all over the country. Only on the 8<sup>th</sup> and 9<sup>th</sup> of this month it was necessary to send help from other regions to Galicia for fire fighting.

Rainfall during November and December lead to low risk in all the Spanish regions.

Despite the unfavorable fire events in August, the figures for burned areas in the country are still slightly below the average for the last decade. The total number of fires was 18617, which burned 53673 ha of forested areas and 94499 ha of shrubs and pastures. Out of those fires, 12183 burned areas below 1 ha. There were 42 fires larger than 500 ha. The most affected Autonomous Community was Extremadura, where 18755 ha of forest and 24803 ha of shrubs and pastures were burned. The total burnt area in the country was 0.5% of the total Spanish forest area.

In 2003 nine victims were registered: Two forest fire fighters, two pilots and five members of a family, who were flying from a fire near their home. During this year fires were threatening very frequently houses and people in the wildland/urban interface in several regions

MMA aerial means were used during most of the year up to total 7.103 flight hours, with 24.026 discharges over forest fires. These figures show a huge increase from 2002.

Fire fighting activities are competence of the autonomous regions in Spain. However, the Ministry of Environment, through the National Forest Plan, is in charge of the basic forest fire management including the following activities:

- (1) Coordination with the autonomous regions is carried out through the Comité de Lucha contra Incendios Forestales (CLIF-Committee for Forest Fire Management).
- (2) Compilation and maintenance of the national forest fire database, which constitutes the oldest and most complete of Europe and is used to feed the European Union forest fire data base.
- (3) The meteorological fire risk maps for the following day is produced in collaboration with the National Meteorological Service. Also the NDVI map indicating the degree of moisture content is distributed to the autonomous regions weekly.
- (4) Training activities included the production of educational videos on bulldozers, heli crews and safety. Also courses for training fire fighting chiefs were conducted. It is important to mention that 3 other courses on the analysis of forest fire causes were conducted in 2003 following the series started in the 90s. They have permitted to reduce the level of uncertainty over the causes of forest fires from 50% in the 80s to 15% at present.
- (5) Finally activities for harmonizing methods for firemen recruitment, protection, and basic equipment were carried out.
- (6) Other activities included the support to research and development through the collaboration with universities and national and international research centre.

(7) Subsidies to improve fire prevention measures were transferred to the autonomous regions. Also, in areas that suffer a large number of fires, special prevention teams (EPRIF) were deployed. These teams are in charge of investigating fire causes, promoting fire prevention education in the population, and the use of prescribed fire with the farmers as a tool for fire control.

Figure 8 shows the evolution of the number of fires and burnt areas in Spain in the last decades.

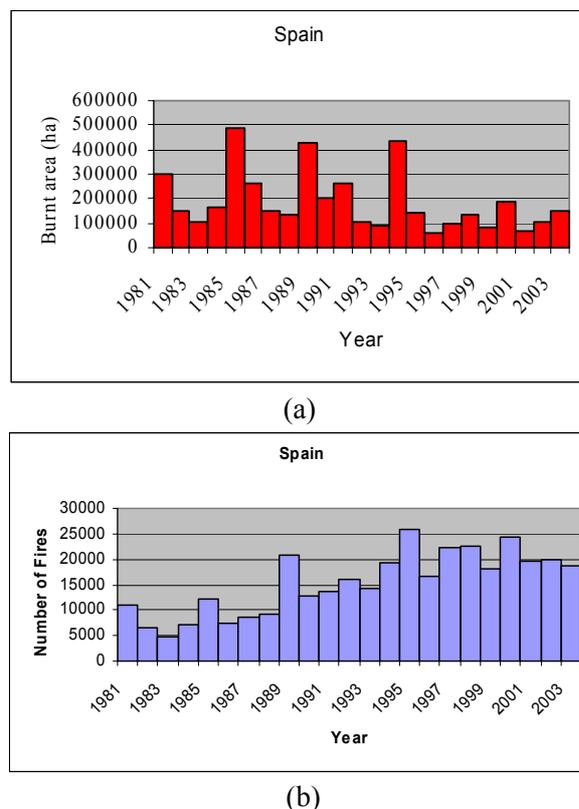


Figure 8. Burnt area and number of fires in Spain in the last 23 years.

(Source: *Ministerio de Medio Ambiente, Secretaria General para el Territorio y la Biodiversidad, Dirección General para la Biodiversidad, Madrid*).

## 2.4. France

The most important fires occurred during the summer months, which required large measures of protection to the population, occurred under extreme meteorological conditions. These conditions included an extremely dry period over the Mediterranean region that was worsened due to the very high summer temperatures. These

conditions of extremely dry weather were persistent since mid-July.

The number of meteorological sectors assigned to very high or exceptionally high risk was larger than 1500, when the average for a summer campaign is 380. In 1989, the previous most difficult year (55.000 ha burned), this number was as big as 800 at the end of the summer.

More than 61.000 ha have been affected by fire in the Mediterranean areas during 2003 (10-year average was 10.000 ha), from which 50.000 occurred during the summer (10-year average was 8.000 ha). These numbers are the highest ever since the Prométhée database has been set up in 1973.

The administrative regions more affected by fires were Haute-Corse (21.000 ha), Var (19.000 ha), and Corse-du-Sud (6.500 ha). Nevertheless, almost every other Mediterranean administrative region was affected by important fires.

During this summer, 14 fires reached more than 1000 ha burned (6 in Haute-Corse, 4 in Var, 1 in Corse-du-Sud, 1 in Lozère, and 1 in Ardèche), while the 10-year mean of fires larger than 1000 ha is of only 1 fire per summer. There were also 50 fires larger than 100 ha as compared with 15 fires in average during summer. Finally, the fires smaller than 5 ha represented 90% of the total number of fires.

The intensity of the 2003 fire season is further reflected by large number of buildings destroyed and by the death of 10 people, 4 of them being fire-fighters. Around 100 people helping in the rescuing works have also been wounded from which 2 suffered severe injuries.

An unmatched situation in terms mobilization of national means took place. Important fire-fighting means had to be mobilised both for preventive reasons and for attacking the fires whenever the initial attacks were not effective:

- a total of 9000 operational flight hours were performed by the 25 civil protection airplanes (11 Canadair, 12 Tracker, 2 Fokker 27), as compared with 4300 hours in average for the period 1998-2002. The shortage of flight hours around middle august lead to emergency measures such as the reinforcement of maintenance, the help of 2 Russian heavy water bombardier helicopters in the framework of an international co-operation agreement, and the hiring of 1 airplane to Canada.

Further international aid was made available through the contribution of Italian, Spanish, and Greek Canadairs, 1 heavy Italian helicopter and 3 German Super-Puma.

The situation of this year has shown the need to replace the soon as possible the 2 FOKKER 27 airplanes which cannot reply operationally anymore to the fire fighting requests.

- 5000 tons of retardant products have been used increasing the effect of the water bombardiers action.

- The *UIISC* have intervened in 450 fires.

- in terms of national support, several forest fire brigades have been mobilised, and the urban centres of the most affected regions were also reinforced in order to increase the forest-fighting means at the local level. A total of 1.500 fire-fighters from different regions of France were engaged in order to help in Southern France.

- the participation of the military forces, foreseen by the protocol between the Ministries of Defense and Internal Affairs, was also very important.

The transport to areas of difficult access was assured by 730 flight hours of helicopters, together with 770 hours of light surveillance helicopters, and 1.300 monitoring missions were fulfilled by the adapted surveillance modules (MAS). The risk levels were also monitored by 300 to 500 soldiers and 3 to 8 helicopters. From a total of 2000 registered fire, 820 have been supported by the help of the national means.

### ***The situation out of the South Mediterranean areas***

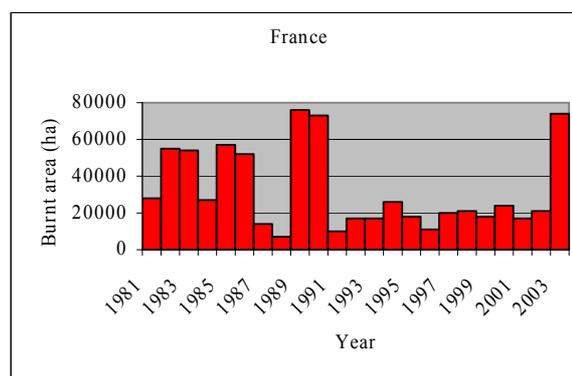
Besides the Southern region other areas were affected by fires during the summer. In particular, the South-east (2800 ha) and the South-west (3000 ha) have greatly contributed to the 12.500 ha burned in the non-Mediterranean areas (in average 7.000 ha).

The aerial means in these areas were used 75 times.

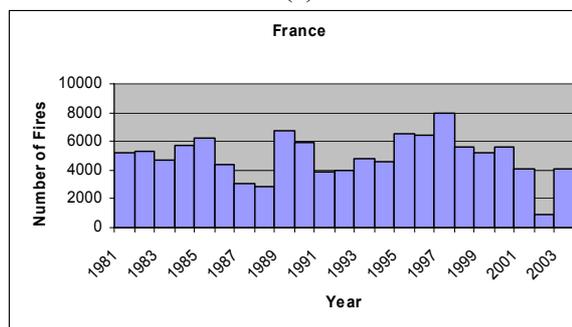
A vast part of France has suffered high risk of fire due to the very pronounced spring precipitation deficit together with the exceptional

high summer temperatures. A total of 13 fires reached more than 100 ha: 6 in the South-west, 6 in the South-east, and 1 in the East, leading to increased problems for the operational fire fighting means during the summer.

In total, 74.000 ha were burned in France from which 67.000 ha during summer, while the 10-year average has been settled to 19.000 ha. The fire damage of 2003 are only comparable to those of 1989 and 1990 when around 75.000 ha were affected by fires.



(a)



(b)

Figure 9. Burnt area and number of fires in France in the last 23 years.

(Source: Direction de la Defense et de la Securite Civilés (Sous-Direction de L'Organisation des Secours et de la Cooperation Civilo-Militaire, Bureau de Coordination Interministerielle de Defense et de Securite Civiles: Elements sur la Campagne feuz de forests 2002 dans les departments Mediterraneens)

## **2.5. Italy**

It is necessary to analyse the areas burnt in 2003 taking into account the particular weather conditions between the end of June and mid-September.

During summer 2003 the meteorological conditions in Italy were particularly hot and dry as in other European Countries.

From Russia to the Iberian Peninsula temperatures had scored to the highest levels in decades, over the average of the period of more 10 ° C in many cases. During the crushing heat wave between June and August, which triggered several thousand more deaths than usual, average temperatures eclipsed the previous record set in 1757. The average temperature in Europe was 19.5 degrees Celsius, two degrees higher than the average summer temperatures recorded on the continent between 1901 and 1995.

Central Europe and the Alps region were the worst affected by heat wave, with temperatures up to five degrees higher than average. Forest fires, fanned by heat, high winds and drought, killed many people in Portugal, Spain, France and Italy.

The responsibility was attributed to African high pressure. It is normal that African high pressure comes till south central Europe but it happens for short periods only. Due to very unfavourable conditions, July and August were the worst month in terms of number of forest fires (58.2%) and also responsible for the highest monthly burned area (63,073). This value corresponds to more than 2/3 (68.7%) of total burned surface in Italy for this year. On average, during the months of July and August about 1038 ha were burnt every day (Table2).

Table 2. 2003 Forest Fires in Italy by month

	number of fires	wooded area (ha)	not wooded area (ha)	total area (ha)
January	87	134	348	483
February	407	804	1.649	2.453
March	962	2.841	2.514	5.355
April	351	1.686	803	2.489
May	314	497	311	808
June	804	4.025	7.176	11.201
July	2.840	13.283	18.445	31.728
August	2.808	17.098	14.248	31.346
September	852	2.461	1.339	3.800
October	172	980	706	1.686
November	24	31	53	84
December	76	222	148	370

Forest fires affected numerous Regions causing an uninterrupted operational support activity during all the summer season.

Despite this long high risk period and unlike previous years, the situation was never out of control. The important effort of the Italian

government to reinforce the action of the Regions, the Fires Brigades and the State Forest Guards, and to allow the application of a large set of measures of operational prevention led to the control of the situation.

The winter season was also abnormally dry, which lead to very favourable conditions to fire ignition and propagation. These conditions associated again with very strong and dry winds, where responsible for the 1,456 fires that burned about 8,300 ha.

Most of the fires occurred in the northern Region with 24.3% (2,359) of overall value for 2003. Nevertheless, the highest value of burned area occurred in the Tyrrhenian Regions and in the islands with 80.7% of total burned area, especially during summer season (Table 3).

At the end of July, some of the large fire in Friuli where caused by lighting. Other caused such as pasture burnings, arson and burning of litter where responsible for large fires in Campania and Calabria.

Table 3. Forest fires in Italy by region

Region	Number of fires	wooded (ha)	Non wooded (ha)	Total (ha)
Valle D'Aosta	33	309	60	368
Piemonte	431	2.864	1.983	4.847
Lombardia	385	687	772	1.459
Trentino A.A.	111	83	53	159
Veneto	97	311	56	367
Friuli V. G.	272	1.442	597	2.041
Liguria	851	5.069	2.675	7.744
Emilia R.	179	185	385	569
Toscana	1035	4.130	2.639	6.768
Umbria	145	425	206	631
Marche	101	205	91	296
Lazio	677	5.516	3.546	9.063
Abruzzo	91	267	349	615
Molise	111	80	190	270
Campania	1489	3.777	2.699	6.476
Basilicata	388	1.559	2.249	3.808
Puglia	268	633	1.016	1.649
Calabria	1456	3.193	5.856	9.049
Sicilia	618	5.246	13.352	18.599
Sardegna	959	8.081	8.967	17.048
<b>TOTAL</b>	<b>9.697</b>	<b>44.062</b>	<b>47.741</b>	<b>91.803</b>

The highest number of fires occurred in Campania (1,489), in Calabria (1,456) and Tuscany (1,055). The Regions that were affected in terms of burnt area were Sicily (18,598 ha) and Sardinia (17,047 ha).

Looking into the last decade, years such as 1990, 1993, 1994 and 1998 were remarkably bad in

terms of burnt area, which lead to the high average in this last decade. In 2003, there were 9,697 forest fires, 163 of which were big fires with more than 100 ha.

The State support was crucial in 2003. Aircrafts and helicopters coordinated by the Joint Aircraft Operational Centre (JAOC) flew a total 8,705 hours in fire fighting operations, 7,138 flight hours were of Canadair CL 415 and Helicopter Air-Crane S 64.

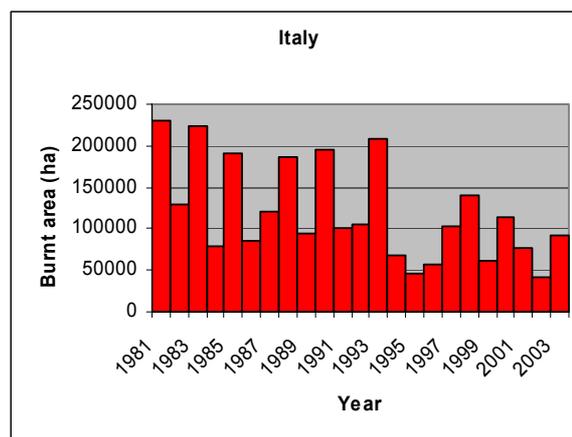
Water/Foam-Dropping planes had 4,042 operational flight. Planes and helicopters participate to the extinction activities of more 2,225 fires, about the 22% of the summer fires.

The difficult campaign has made evident the need to increase the efforts leading to limiting the number of fires and to continue the preventive measures seeking the establishment of forest fire risk prevention plans on forest areas and inhabited areas affected by forest fires, bringing the attention of the public on the fire problem.

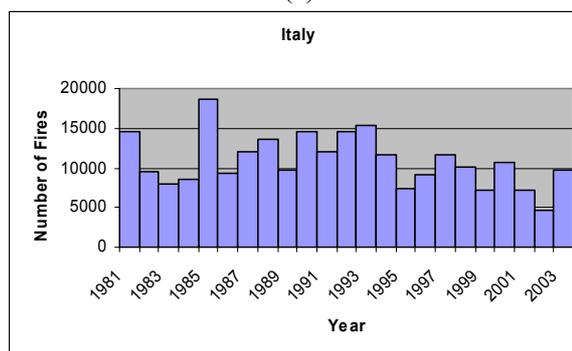
The Department of Civil Protection in 2003 developed a Decision Support System (DSS) for the Forest Fires emergencies management. The objective was to define a DSS capable of providing useful indications for the pre-operational allocation and the operational phases of the aircrafts coordinated by the Joint Air Operation Center. An index is computed which differs from meteorological indices in the fact that is derived from different layers of information (fuel type, vegetation stress, moisture and meteorological).

Table 4. 2003 Forest Fires larger than 100 ha

	number of fires	wooded area (ha)	not wooded area (ha)	total area (ha)
January	1	18	82	100
February	4	119	1,010	1,129
March	8	829	1,038	1,867
April	6	1,037	407	1,444
May	-	-	-	-
June	25	2,229	4,473	6,702
July	57	5,265	9,033	14,298
August	52	8,619	6,892	15,511
September	6	921	271	1,192
October	4	741	549	1,290
November	-	-	-	-
December	-	-	-	-



(a)



(b)

Figure 10. Burnt area and number of fires in Italy in the last 23 years.

(Source: Ministry of Agricultural and Forestry Policy, State Forestry Corps, Forest Fire Service, Italy: Forest Fires in 2002).

## 2.6. Greece

The results of the fire campaign of 2003 in Greece did not have many differences from the year before. The number of forest fires as well as the burnt area remained at about same levels.

The region of Peloponisos had the largest number of fires (247). Nevertheless, we find the largest burnt area (541 ha) at the region of St. Greece, although the number of fires is smaller (188). On the contrary, the region with the smallest number of fires and burnt forestland is S. Aigaiou (20 fires, 26 ha).

The aerial means used during the campaign are indicated in Table 5.

The personnel involved in suppression efforts was about 15,500 persons from which 10,000 is permanent personnel of the Fire Brigade which deals also with the structural fires and 5,500 is the seasonally hired personnel just for the forest fire suppression activities. Fire Brigade of Greece owns at about 1,150 engines, which are involved

in both structural, and forest fire suppression efforts and few more small engines owned by Municipalities of high risk areas were involved occasionally in some incidents.

Generally, although the weather conditions were more difficult than they were in 2002, the fact that the number of fires and the burnt area were kept at the same level as the year before shows a successful fire campaign. We see also that the fire weather behavior during the 2003 was very closer to that of 2001 where the damages were much higher.

The success of the 2003 campaign is due to a sound preventive as well as operational planning, and execution of the suppression efforts.

There was no fire that exceeded 100 ha. This fact was the result of coordinated efforts of in time warning and successful initial attack mostly with use of aerial means. The small number of fires allowed availability of aerial means to attack all incidents with potential extreme behavior. In the future, in cases of more difficult conditions like those in West Mediterranean countries this year, and many major incidents is possible to exceed the availability of aerial means for initial attacks. Then there will be problems of control, that is why to rely heavily on the support of aerial means is not enough, but is needed more active participation of the ground personnel and means and improvement of their independent efficiency, in order to maximize their potential contribution in controlling major incidents.

During the campaign, unfortunately, there was a death of a pilot during the suppression activities, caused by the crash of an aircraft type Pezetel. The incident took place at Agiasos, Mytiline Lesvos, at 16:45, in August 25<sup>th</sup>.

During the fire campaign in response to demand of mutual assistance 2 CL-415 participated in operations in South France, while were not able to respond to demand for help from Portugal in August, due to high fire danger weather conditions in Greece at the same time.

The fire campaign of 2003 was well focused to preventive measures and especially to raise the level of awareness of the public and the services involved during the high fire risk days. As a result the local authorities and the public were well informed ahead of such days in order to avoid actions that could initiate fires or to react properly and speedy when they were facing an incident in their territory.

For 2004, special attention to preventive measures and to better coordination efforts has been put in place because of the Olympic Games to be held in Greece.

The mission of General Secretariat of Civil Protection of Greece is the planning and setting-up of the policy in matters of management of natural disasters and informing the public, as well as the coordination of all action forces related to Civil Protection

With an annual civil protection fire plan General Secretariat of Civil Protection sets-up all actions for prevention, pre-suppression and preparedness to protect human lives and properties from wild land fires.

Table 5. Aerial means participated during the campaign of 2003.

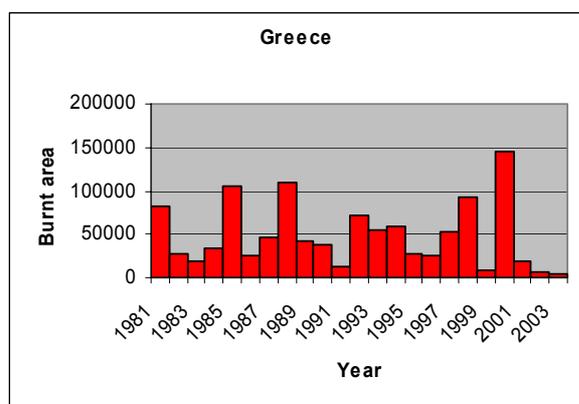
STATE OWNED MEANS			
Aircrafts	LARGE	CL-215	15
		CL-415	9
	SMALL	PEZETEL	18
		GRUMMAN	6
HELICOPTERS	H/P PK 117		2
<b>TOTAL</b>			<b>50</b>
HIRED MEANS			
Aircraft	CL-215		0
HELICOPTERS	H/P MI-26		4
	H/P SIKORSKY 64		3
	H/P MI-14		1
	H/P KA-32		4
	AC355		0
<b>TOTAL</b>			<b>12</b>

For this purpose, CP gives instructions to regional and local authorities of Civil Protection (13 regions, 54 prefectures and their corresponding CP offices in the municipalities of the country) how to prepare and organize their annual fire plan and cooperate with other authorities (Fire Brigade, Forest Service etc) to improve their capability for firefighting.

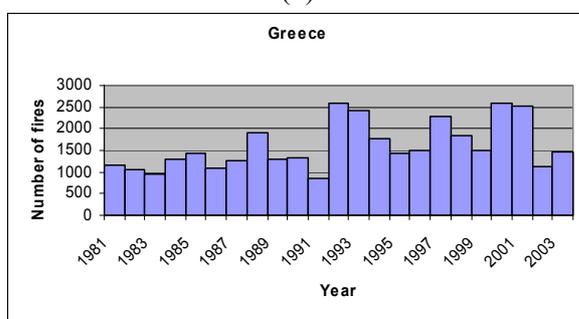
In addition to that, a group of fire experts has been established that issues a fire danger map on a daily basis. This map is sent to all local authorities involved in forest fires and aids in raising their preparedness levels.

The Fire Brigade also is going to hire additional ground personnel due to that partly its permanent personnel is going to be involved in matters of security operations during the Olympics. Patrolling intensity will increase during the Olympic Games in all agencies involved in forest fire prevention activities

Cooperation among organizations that contribute to forest fire confrontation activities due to technological legislative improvements is expected to reach much higher levels than the previous years.



(b)



(a)

Figure 11. Burnt area and number of fires in Greece in the last 22 years.

The Ministry of Agriculture – General Directorate for Development and Protection of Forest and Natural Environment, in addition to the already applied yearly prevention activities' programs, will add the following:

An additional removable network of water tanks will be established this year (2003) by the Ministry of Agriculture (Forest Service) to support suppression efforts and to expand the already existed network of the 1500 non-removable water tanks all over Greece. The establishment of this removable water tank network will start in May and is expected to be completed before the next fire campaign.

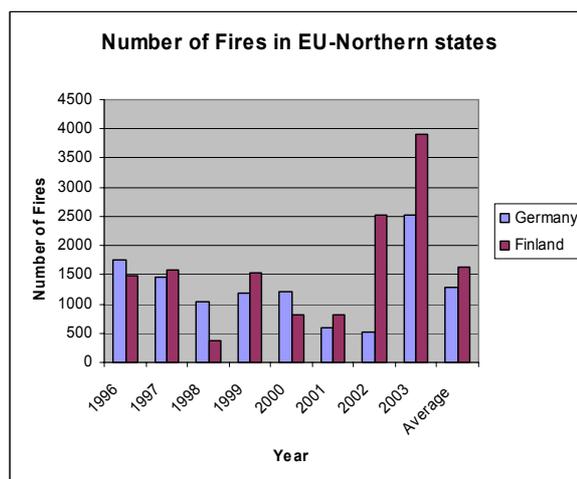
The establishment of another special meteorological station network devoted mainly to use for forest fire prevention is expected also to be completed by the end of this year.

(Source: Ministry of Agriculture, General Secretariat for Forest and Natural Environment, Protection of Forest and Natural Environment

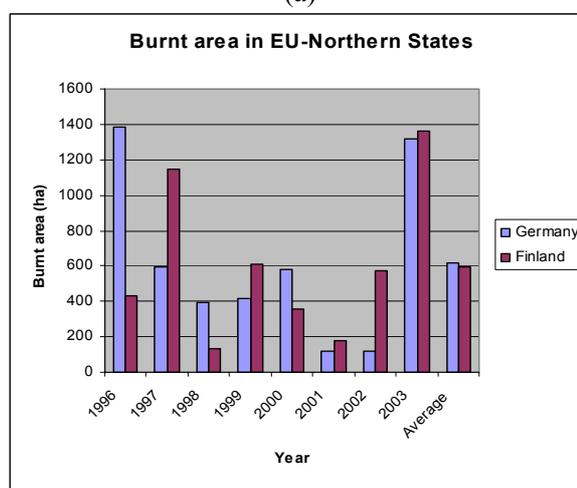
Directorate, Forest Prevention and Suppression Department).

### 3. FIRES AND BURNT AREA IN THE NORTHERN STATES

The analysis of the situation of Northern States is presented in a separate chapter because the fire figures in terms of number of fires and area burnt differ largely from those of the southern states that were presented in the previous chapter.



(a)



(b)

Figure 12. Number of fires and burnt area in EU-Northern states

#### 3.1. Germany

In 2003 the number of fires in Germany was 2524, which is well above the average for the last 8 years presented on Figure 12(a) and near the maximum number of fires occurred in the country in 1992 (3012 fires). The high number of fires is probably due to the high temperatures reached in all European countries during the summer of

2003. The area burnt by those fires (1315 ha) is also above the figures of last year and much higher than the average for the last 8 year. It is slightly below the maximum fire damage caused by forest fires in 1992, which reached 4908 ha. None of this fires was larger than 50 ha. Brandenburg was the lander with the highest number of fires (718), which burnt 617 ha. The next Lander, in terms of fire damage was, Bayern with 204 ha burned by 182 fires. In the whole country, fires burned 782 ha of conifer forests and 532 ha of deciduous forests. The highest number of fires occurred in August with 847 fires; this month was followed by April with 442 fires, then June with 355 fires and July with 331 fires. The damage caused by forest fires was estimated in 3 million Euro, with an estimated cost by hectare of 3000 Euro in the last decade.

### 3.2. Finland

In Finland, the number of fires was 3902, higher than that of the previous year (2512) and well above the average for the last 8 years (1628) for which data area available. The area burnt by these fires was the largest in the last 8 years.

The number of fires and the burned area in the northern Member States was above the average for the time series that are available. The differences with previous years and the average for the period under consideration can be easily observed in Figure 12. A summary of the figures presented above for Germany and Finland is presented in Figure 12 and Tables 6-7.

### 3.3. Austria

Austria has a total area of 83,858 km<sup>2</sup> and has 9 provinces, 15 towns with separate charter, 84 administration districts, 2.350 municipalities.

The fire service is composed by 4,567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). Overall there are about 290,000 fire fighters in the country.

On average each municipality has 2 fire brigades and the response time for action is < 10 - 15 minutes. It must be taken into account that this time is only for actions in the flatland and not for mountains. Based on this fact the burned area per action is small, for example only ~ 1.000 m<sup>2</sup>. The largest burned area per place of operation was about 15 ha.

### *Database for wildland and forest fires 2003*

Wildland fires: 2.415 actions / burned area: ~ 240 ha.

Forest fires: 2.562 actions / burned area: ~ 250 ha

Last year a lot of wildland and forest fires occurred in comparison with 2002 when 902 actions were operated in forest fires and 1,752 actions in wildland. The difference with 2003 is more than 184 % for forest fires and 37 % for wildland fires.

### *Technical equipment*

In Austria special-equipment against the wildland and forest fires are not in use. In the mountains helicopters from the Austrian Army are brought in action. The Army use Alhouette, Bell 212 and Black Hawks. The capacity for watertransport is 1.000 liter and 3.000 liter with the Black Hawks. On the place of operation we use little tanks with high pressure pumps, fog nails and so on.

We also have some task force units for international actions. For example: lower Austria, up-per Austria, Salzburg, Vorarlberg. These units have about 30 fire-fighters and the equipment.

### 3.4. Sweden

On a national level, the summer of 2003 was not overly subjected to forest fires. However, the conditions in northern Sweden were more taxing, with a greater risk of fire, which subsequently led to more fires than in an average year.

Sweden has no official body tasked with the collation of forest fire statistics. The table at the end of this text shows the statistics that have been reported via the voluntary reporting of statistical information about emergency operations that the municipalities report to the Swedish Rescue Services Agency.

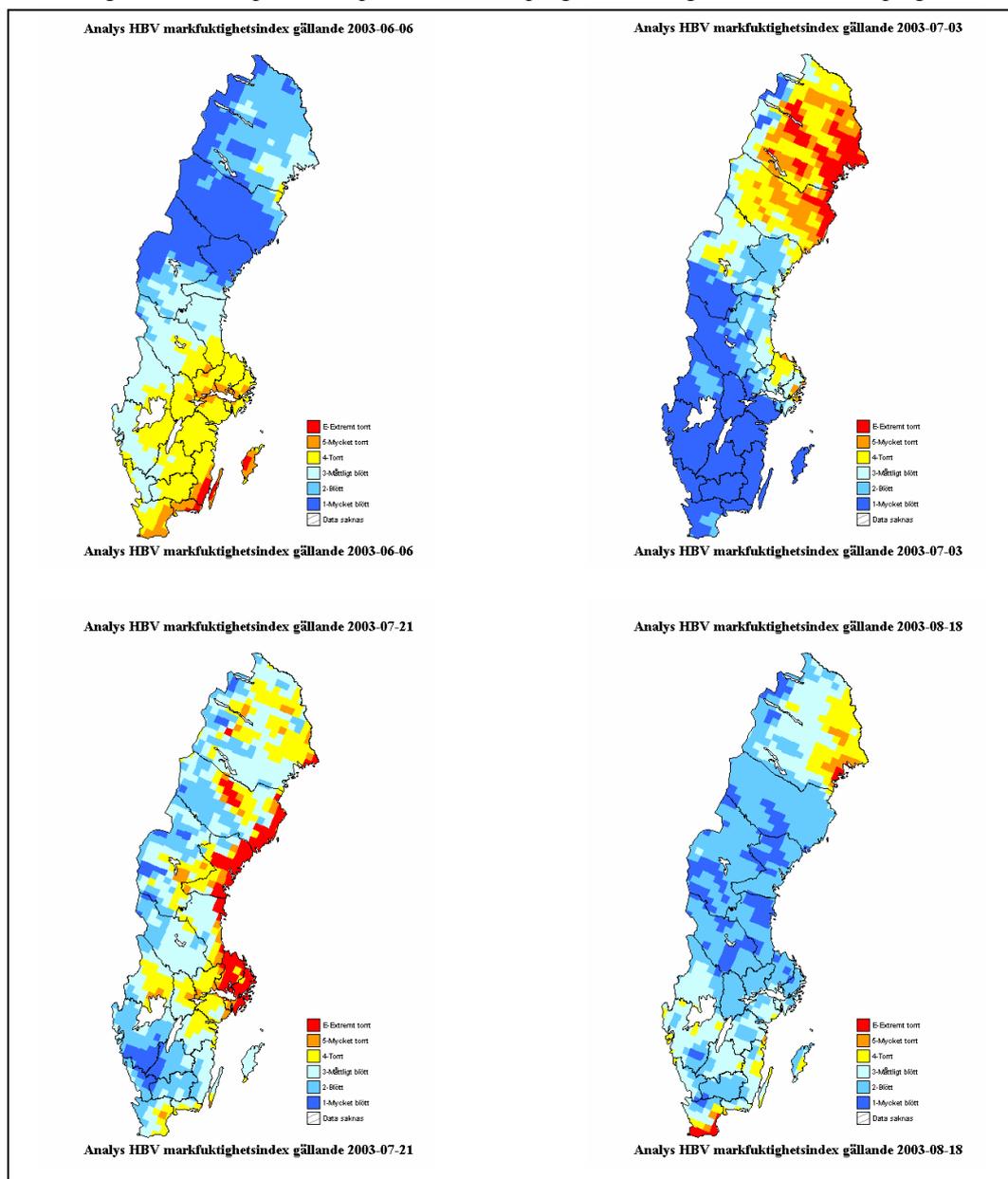
### *General assessment of the forest fire risk for summer 2003*

At the beginning of the summer it was dry in south-eastern Sweden. However, there were no major forest fires, but early on there were quite a lot of grass fires.

At the end of June the fire risk increased considerably in northern Sweden, and by the end of July it was very or extremely dry. Northern Sweden suffered several major forest fires, and many smaller ones in connection with thunderstorms. The eastern part of Sweden also

became dry by the middle of July. The dry conditions in the east remained until the beginning of August.

Figure 13. Examples of maps with fire risk prognosis during the 2003 fire campaign



There were no victims in productive forest fires in 2003.

#### ***Miscellaneous information from the log of the SRSA Duty Officer***

Request to the SRSA from Sollefteå Municipality on 21 July for assistance with an ongoing forest fire. An intake of Civilian National Service Fire & Rescue Operatives assisted the municipality.

Several media representatives contacted the Duty Officer or someone else at the SRSA for comment about how forest fire monitoring will be

conducted during 2003, and about fire risk prognoses etc.

22 July – there are several fires in northern Sweden, which have been reported by the media. The SRSA is in contact with Umeå about the situation. In connection with the media reporting of these fires in northern Sweden, opinions are coming in from many sources about the need for forest fire monitoring from the air, and that the government has reduced resources, such as helicopters for fire extinguishing.

Tables 6-7 provide a summary of the number of fires and burnt areas according to land cover type in Sweden. Although this statistics are available by month, they have been merged to provide annual figures.

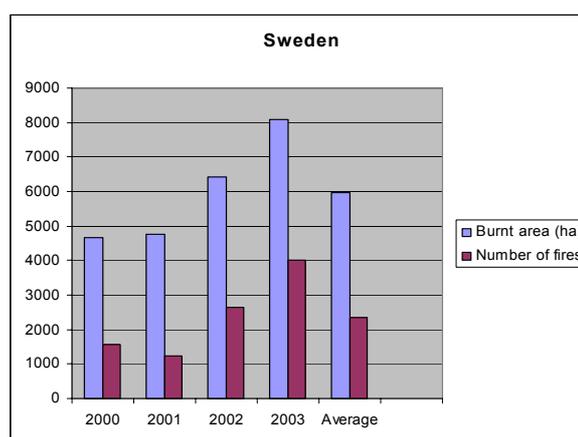


Figure 14. Burnt area and number of fires in the last 4 years in Sweden.

Table 6. Number of fires and burnt areas in Sweden by landcover type

Number of Fires				
Year	Productive woodland	Other wooded land	Non-wooded land	Total all wood and land
2000	400	1755	2553	4650
2001	476	1669	2686	4774
2002	922	2637	2931	6421
2003	840	2777	4665	8071
Burnt area (ha)				
Year	Productive woodland	Other wooded land	Non-wooded land	Total all wood and land
2000	784	329	440	1552
2001	412	286	556	1254
2002	877	413	1336	2626
2003	1316	1021	1665	4002

Table 7. Number of fires and burnt area in Finland and Germany

Year	Number of Fires		Burnt area (ha)	
	GERMANY	FINLAND	GERMANY	FINLAND
1991	1846		920	
1992	3012		4908	
1993	1694		1493	
1994	1696		1114	
1995	1237		592	
1996	1748	1475	1381	433
1997	1467	1585	599	1146
1998	1032	370	397	131
1999	1178	1528	415	609
2000	1210	826	581	355
2001	587	822	122	179
2002	513	2512	122	573
2003	2524	3902	1315	1359
<b>Average 1996-03</b>	<b>1282</b>	<b>1628</b>	<b>617</b>	<b>598</b>
<b>Total</b>	<b>19744</b>	<b>13020</b>	<b>13959</b>	<b>4785</b>

Source: Ministerium des Innern des Landes Brandenburg, Referat III/4, Germany; Ministry of Interior, Finland

(Sources: *Landesschule und Technische Einrichtung für Brand-und Katastrophenschutz für Germany*, and *Ministry of Interior for Finland*; *Austrian Federal Fire Brigade Federation, Departmental 5, Operational Tasks and Education, Austria*; *Leif Sandahl Swedish Rescue services SRSA, Sweden*).

#### 4. OPERATIONS OF MUTUAL ASSISTANCE BETWEEN THE MEMBER STATES

During 2003, the abnormal situation of forest fires in Portugal led to the request of mutual assistance for several times. Those actions were taken under the scope of bilateral agreements or according to MIC support.

During first large fires in middle-July, in Northeast and Centre areas of Portugal, there was a need of requesting aerial means to Spain, according to the bilateral cooperation agreement existent between the Portuguese Republic and the Kingdom of Spain. Additionally, in a fire occurred near the border, terrestrial fire-fighting means (man and equipment) were also involved. During the critical period (from the end of July until middle-August), Portugal has again requested (and received) aerial means from Spain at the initial stage of the fires. However, the increase of forest fires in the Spanish territory becomes impossible to maintain in Portugal aircrafts from Spain. So, a request of aerial means to other countries with cooperation agreements with Portugal was made, and other request was disseminate by MIC. Help was received from Morocco (bilateral agreement) with 4 aircrafts, and from Germany and Italy (answering to MIC request), the first with 2 aircrafts and the second with 3 helicopters. Other countries excuse for their impossibility of helping Portugal, due to critical situation of forest fires in their own countries.

In September, a new period of extreme meteorological conditions led to large forest fires. Again, Portugal requested aerial means from countries with cooperation agreements, receiving aircrafts from Spain and France (2 planes).

##### **Bilateral cooperation agreements of Portugal**

Between Portugal and Spain (since 1992): for technical cooperation and mutual assistance in Civil Protection issues;

Between Portugal and France (since 1995): for Civil Protection actions;

Between the Portuguese Service for Fire and Civil Protection and the Civil Protection Command of Romania (since 1999);

Between Portugal and Russia (since 1999): for cooperation in Civil Protection actions, prevention and emergency management;

Between Portugal and Morocco (since 1998): for Civil Protection actions;

Between Portugal and Tunisia (since 1998): for Civil Protection actions;

Between Portugal and Angola (since 1997): for internal security subjects;

Between the Portuguese Ministry of Internal Affairs and de Ministry of Defence of Cape Verde (since 1998): for Civil Protection actions;

Between Portugal and Mozambique: for Civil Protection actions.

The extreme conditions in the Western Mediterranean States made necessary to share resources in operations of mutual assistance. Spanish resources were sent to Portugal during 19 days, flying 268 hours with 718 discharges, and to France during 5 days, flying 28 hours with 48 discharges. Total cost of these interventions amounted 991.559 euros in flying hours. According to the bilateral agreements between Spain and Portugal and France, this cost was paid by the Spanish Administration.

#### 4.1. Lessons learnt on Mutual Assistance from the summer 2003 forest fires: Evaluation of the role of the European Union's Monitoring and Information Centre (MIC)

##### 4.1.1. Information flow between the participating countries in the mechanism during the summer 2003 forest fires

On 28 July 2003, at 20:00 hours, the French National Contact Point informed the Civil Protection Monitoring and Information Centre (MIC) about severe forest fires in southern France in the areas of Vidauban, Puget sur Argens, La Motte, Fayence (Var) and Bonifacio (Corsica). The MIC was immediately activated. At the request of France, a message was sent to all participating countries in order to anticipate whether they could dispatch fire fighting helicopters including crews in the event of a formal request for assistance from the French authorities. The message stated that all communications should be sent directly to the

French authorities with copy to the MIC. At that time, France had already sent a request for assistance on a bilateral basis to Italy for one helicopter and one intervention team.

On 29 July 2003, at 0:24 hours, Spain informed the MIC about the availability of three fire-fighting helicopters, located between 70 and 700 kilometres to the border. At 3:38 pm, Norway informed the MIC about the availability of two helicopters Bell-214, one immediately, and one in 10-14 days.

On 30 July 2003, at 12:24 hours, Greece informed the MIC on the dispatch in the afternoon of two CL-415 fire-fighting aircraft. At 15:30, Germany informed the MIC about the availability of three SA 330 Puma fire-fighting helicopters and four CH-53 transport helicopters.

On 31 July 2003, at 12:00 hours, France informed the MIC on its acceptance of the three German SA-330 Puma helicopters that should arrive in Marignane on the afternoon.

For France's request, 16 participating countries answered the message sent out by the Civil Protection MIC on 28 July. The MIC has remained in close contact with the French authorities during the whole period. France has accepted assistance from Italy (2 helicopters, 2 Canadair), Spain (2 Canadair), Greece (2 Canadair) and Germany (3 helicopters).

On 1st August 2003, at 23:20 hours, the Portuguese National Contact Point informed the European MIC about severe forest fires in the centre of Portugal and sent an assistance request related to Canadairs and heavy helicopters for fire combat. The MIC sent immediately a request for assistance to all participating countries.

On 2 August 2003, at 01:42 hours, Sweden informed the MIC that it was not able to send any fire fighting helicopters in Portugal, because of its own risk of forest fires. At 08:43 hours, Italy informed the MIC about the availability of two Canadair, which left Italy in the afternoon. At 09:10 hours, Greece informed the MIC on the current engagement of two Greek Canadairs in France. At 10:56 hours, Spain informed the MIC about its own critical situation. At 13:00 hours, France informed the MIC on the current important fires in France, and on the high risks expected. At 15:29 hours, Germany informed the MIC about the availability of aerial means. Three helicopters were already engaged in fire-fighting operations

in France. The German offer was immediately transmitted to Portugal

On 3 August 2003, at 18:09 hours, France informed the MIC that the German and Greek aerial means engaged in fire-fighting operations in France would be released on the 4 August.

On 4 August 2003. At 09:45, Norway informed the MIC about the availability of two helicopters Bell-214, one immediately and one in 10-14 days. Portugal was not in a position to accept it.

On 5 August 2003, Spain and France confirmed their own critical situation. For this reason, these two countries were not in a position to offer help.

On 6 August 2003, at 10:50 hours, Germany informed the MIC that the three German helicopters left Biarritz (in France) and were expected in the afternoon in the Coimbra district. At 16:00, Greece informed the MIC that due to its critical situation, it was unable to send aerial means to Portugal. At 18:00, Portugal informed the MIC that the Italian aerial means had been released on the same day at Italian request, due to the critical situation in Italy.

For Portugal's request, 21 countries answered the messages sent out by the Civil Protection MIC since 1st August. The MIC was all along in close contact with the Portuguese authorities. Nine messages have been sent to all participating states, informing on the updates of the situation and requesting assistance as the situation on site was gradually worsening. Portugal has accepted assistance from Italy (2 Canadairs) and Germany (3 helicopters). On 15 August 2003 Portugal suspended its request for aerial means and the MIC suspended its activation as well.

#### 4.1.2. *Main lessons learnt*

In spite the efforts of the MIC and the good will of the participant countries, the international assistance conveyed through the MIC proved to be limited to two Italian Canadairs and three German helicopters. Obviously lessons can always be drawn. Improvements in the working of the MIC are clearly possible. Nevertheless, the MIC has worked reasonably well within its mandate, and the reason for this apparent shortcoming is imputable to the current mandate and framework. Indeed:

- i. The MIC has to rely on the intervention teams and equipment available in the Member States.

During summer 2003, all southern countries were affected simultaneously and had difficulties to offer assistance to their neighbours. So far, Council Decision 2001/792/EC did not foresee that the MIC liaises with third countries and international organisations, should the necessary means not be available within the participating countries.

- ii. Financial aspects of the assistance have slowed down the intervention.
- iii. The use of the MIC is on a purely voluntary basis on the part of the participating countries. There is no obligation to inform the MIC that assistance has been supplied to another country. There is no clear obligation to inform the MIC when a major disaster occurs, even if the disaster is capable of causing transboundary effects.
- iv. The MIC has a data base containing a list of resources available in the participating countries. This data base is not sufficiently detailed.
- v. Response time to assistance requests is often incompatible with the 12 hours time delay laid down in article 3(a) of the Council Decision.

#### *4.1.3. The improvements needed- participating countries' expectations*

The primary responsibility for dealing with the immediate effects of a disaster lies with the Member State and participating countries where the disaster occurs. However, because the scale of the disaster may overwhelm local and national response capacities, the MIC allows Member States and participating countries to support each other with additional equipment and manpower when a major disaster occurs.

According to article 3(b) and 3(c) of the Council Decision, Member States have selected experts who can be called on to serve on the site of an emergency in an assessment and/or coordination team and have provided relevant general information on these experts. According to article 4(c) of the Council Decision, the Commission has established the capability to mobilise and dispatch, as quickly as possible, these small teams of experts. Since the entry into force of the Council Decision, the dispatch of assessment and/or coordination teams has never been used for a disaster occurred in a participating country. When the MIC suggested sending such team, the countries affected have always considered that this was not useful.

Experiences from the past emergencies showed that participating countries mainly used the MIC

as a "clearing house", for transmitting and forwarding assistance requests and assistance offers as well as general information.

The MIC could take over other roles in order to facilitate improved coordination of assistance intervention, as stated in article 1 of the Council Decision. Participating countries shall now express clearly what their expectations and requirements are in respect to the MIC. The following issues, shall, in particular be addressed during the discussion:

- 1) Exchange of information during the emergencies, in particular with regard to the teams and means provided to a country hit by a disaster.
- 2) Opportunity to systematically inform the MIC when a bilateral agreement is triggered, in particular, if the emergency may result in a call for assistance through the MIC.
- 3) Role of the MIC, in particular, with regard to its mandate to facilitate improved coordination of assistance intervention.
- 4) Financial aspects of the assistance.
- 5) Role and utility of the assessment and or coordination teams.
- 6) Role and utility of the liaison officer.
- 7) Role of the Member States: delay for responding to assistance requests, quality and completeness of the information delivered to the data basis.
- 8) Relation with third countries and organisations, in particular with a view to establish contact points for forwarding assistance requests when an emergency occurs inside a participant country.

#### *4.1.4. A European forest fire fighting exercise for the improvement of international collaboration*

Under the shield of the European Commission, France organized the first great scale Community exercise on forest fire fighting. Led by the ministry of Interior, of interior security and local liberties (Direction of Defense and Civil Security), this exercise was held from April 18 to 20, 2004 in the Bouche-du-Rhône department. It will integrate the 2003 forest fire campaign.

Written within the framework of the cooperation between European Union member states, it implements civil protection reinforced mechanism, instituted by the European Union Council Decision dated October 23, 2001. It plans the activation of the Brussels Monitoring and Information centre (MIC), as well as the

interconnection with the national operational centers.

The security teams of eight European countries carried out the backup of the French services. The exercise objective was, for the French part, to appreciate the operational chain of command implementing from the exercise place up to the national level, the department operational centers (COD), the defense zone (COZ), of the ministry of Interior (Crisis Interministerial Management operational center – COGIC).

The routing conditions of specialized teams and air means of the participating states (water bombers planes, helicopters, backup columns...) were tested, as well as the whole command chains between the member states, the Brussels Monitoring and Information centre and the states victim of disasters. On the exercise site, a specific command device was implemented integrating the operation and coordination operational command with the entire member states teams.

## 5. INFORMATION TO THE PUBLIC

This chapter provides some update of the information presented in previous bulletins regarding the campaigns that the countries carry out to inform the public and to promote the protection of the forests. Many countries continue the initiatives that they already started, which were already presented previous bulletins.

Several public awareness and education campaigns were conducted in Spain in 2003. Urban campaigns were carried out through television spots on national and regional channels. This activity was complemented by posting advertisements on buses, trains, newspapers and brochures.

The Greek government enhance the effort to train population and to educate the public in order to prevent fires. Several actions were taken on that direction, including:

- A common informing campaign between the three competent Ministries (of Interior Affairs, Public Administration & Decentralization, of Agriculture and of Public order) to make the public more sensitive on forest fires subjects.

- A special informing leaflets edition for prevention measures and for auto protection from forest fires.

- The organizing of seminars for the members of the Civil Protection education on the protection and the suppression of forest fires.

- The organizing, energizing and funding of volunteer groups Civil Protection authorities.

Portugal continued the efforts that were initiated the previous year, which included the publication of leaflets , for adults and children, containing recommendations for fire prevention that were distributed by the district and local structures of Civil Protection.

Italy maintains a web page to promote forest fire prevention through slogans and educational information, including statistics of forest fires in the past years, means that are available for fire fighting, etc. The site also includes useful information for the public on how to act if a forest fire is spotted. It provides a free number (1515) to call from anywhere in the country to alert about forest fires. Finally, the web site contains a section dedicated to youngsters that explains the role of fire in the forest, the way fires start and spread, and what to do in the event of a forest fire.

## 6. FIRE SITUATION IN THE NEW MEMBER STATES.

Since the time series for comparison in the new member states are different from those of the other EU Mediterranean countries and northern states, they are presented in a separate chapter.

### 6.1. Cyprus

During the year 2003, a total number of 427 forest fires broke out in Cyprus that burned 2349 ha of wooded and non-wooded land. Although the number of fires was bigger compared to previous years, the total extent of the area burned was almost the same as that of the year 2002 and significantly lower of the area burned during the years 2000 and 2001. This is the result of the effective measures taken by the Government of Cyprus and the high level of public awareness.

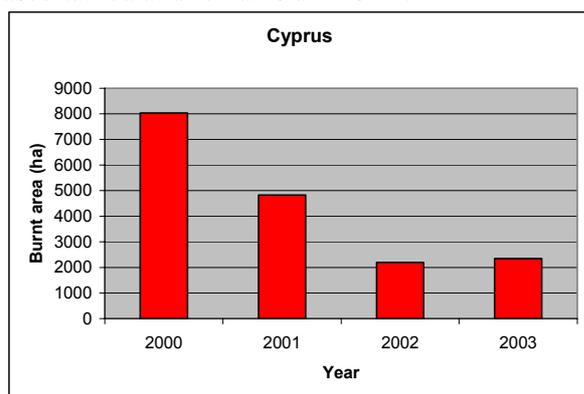
During the 2003 fire campaign no deaths or injuries were reported.

Analyzing the temporal distribution of forest fires it is concluded that most of the fires occurred during July and August (36% of the total number of fires). At the first months of the year 2003,

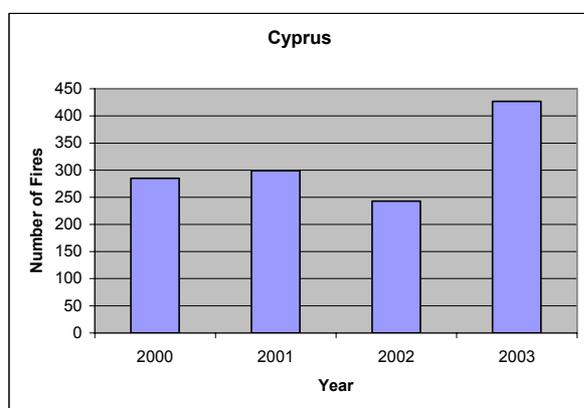
there were no forest fires and this was attributed to the increased rainfall during this period.

Fires that burnt areas larger than 50 ha, represent only 3% of the total number of forest fires.

Most of the fires of the year 2003 are attributed to accident or human negligence (almost 80% of the total number of fires). Various activities related to agriculture were classified first among these. Deliberate fires represent the 7% of the total number of fires and natural fires the 3%. Lastly, the cause of 10% of forest fires was not ascertained and remains unknown.



(a)



(b)

Figure 15. Burnt area and number of fires in Cyprus in the last 4 years.

The main objective of fire prevention measures is to eliminate the causes of forest fires. Since most

forest fires are of human origin, the Department of Forests tries to achieve this target through the enforcement of the Law, the enlightenment of the public, the establishment of picnic and camping sites, and the organization of regular patrols for enlightenment and prevention purposes as well as for quick intervention in case of a fire outbreak.

The responsibilities of the Services involved in fire management are determined by the relevant legislations. During the year 2003, the personnel of the Department of Forests and the Police Fire Service involved together in almost all fire incidents suppression efforts. Forces from other Services such as the Police, Army, Game Fund, District Administrations and Civil Defense, were in many cases actively involved in fire fighting.

A large number of fire engines, crawler tractors and agricultural tractors were as usually used during the fire fighting. The use of aerial means has been practiced in the recent years in Cyprus with excellent results. Helicopters are considered as the most suitable means for the local conditions of Cyprus. For this purpose, two medium Helicopters with a capacity of 5 tons are hired every summer. Army and police helicopters are also used when needed for transportation of personnel and equipment and for coordination purposes.

Despite the great efforts and the good results of the recent years, the problem of the forest fires exists and will always constitute a permanent threat the natural forests of Cyprus. For this reason and in order to reduce the fire danger to the minimum possible, the persistent vigilance and continual upgrading of both infrastructure and personnel training, following the evolution of the technology and its capabilities, are of top priority both for the Department of Forests and the Government of Cyprus.

Table 8. Number of Forest Fires and Burnt Area in Cyprus

Year	Number of fires	Total burnt area	Forest and other wooded land burnt area (ha)	Non wooded land burnt area (ha)
2000	285	8034	2552	5482
2001	299	4830	778	4052
2002	243	2196	166	2030
2003	427	2349	921	1428

(Source: Ministry of Agriculture, Natural Resources and Environment. Forest Department, Louki Akrita, P.O.Box 1414. Nicosia, Cyprus).

## 6.2. Czech Republic

The average number of forest fires per year in the country during the last 6 years is about 1300. Looking at the figures you can see that on the one hand years 2000 and 2003 were above-average but years 2001 and 2002 were below the average as far as the number of forest fires is concerned.

The average burned area per year during the same period is 564 ha, which results in an average burned area per fire of about 0.4 ha.

A total number of 1754 forest fires were registered in 2003, an area of 1665 hectares was burned with an estimated damage of 33.5 million CZK (approximately 1.0 million EUR).

During the 2003 fire campaign 1 person died and 44 injured.

Some of the largest forest fires of the last 11 years occurred. Since 1993 the main forest fires occurred are the following:

- 25.4.1993 - 54 ha - Fryšták, damage: 850 thousand CZK, cause: burning trees
- 16.4.1996 - 80 ha - Nové Sedlo, damage : 130 thousand CZK, cause : open fire
- 19.5.1998 - 21 ha - Arnoltice, damage : 2 783 thousand CZK, cause : open fire
- 13.8.2003 - 30 ha - Nové Hradý, damage : 4 686 thousand CZK, cause: unknown
- 23.9.2003 - 50 ha - Brdy, damage and cause: unknown

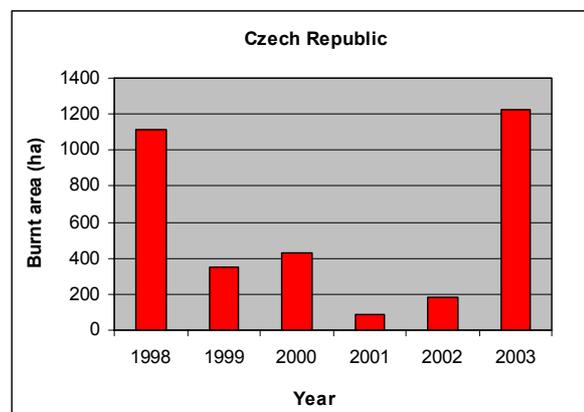
The most common causes recorded were related to negligence (55%), while arson was attributed to 4% of the fires. 33% of the events had unknown causes.

Fires were more frequent in summer, with a clear pick of fire activity in August as it can be seen from Figure 17.

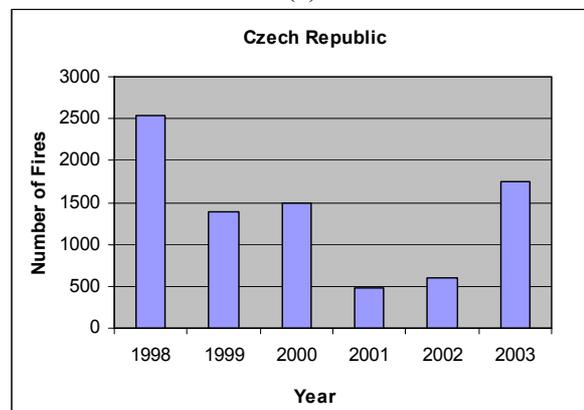
## Patrol flights and aerial fire fighting in 2003

Looking at Table 9 it can be verified the evident increase of patrol flights (also patrol hours) and number of aerial detected fires in 2003. This increase is due to extreme climatic factors of this year. During the year 464 requested patrol flights (700.61 hours) were made by air-crafts of private companies and helicopters of the Police of the Czech Republic. During these patrol flights 31 forest fires were detected.

Due to the mentioned extreme climatic factors, mainly during summer period, there was also the increase of fires being extinguished by aerial fire-fighting.



(a)



(b)

Figure 16. Burnt area and number of fires in Czech Republic in the last 6 years.

Table 9. Patrol flights and aerial fire fighting efforts in the last 4 years in Czech Republic.

	Patrol flights			Aerial fire fighting			
	detected fires	number of flights	hours of flight	number of flights	hours of flight	soaking agent/litre s/	number of extinguished fires
2003	31	464	700.61	541	169,2	325	54
2002	8	388	415.11	43	10.92	51	3
2001	4	287	306.18	78	19.3	71	8
2000	70	743	723.64	196	37.91	220	10

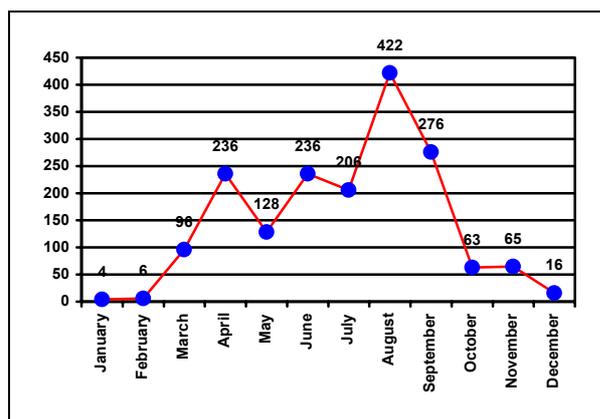


Figure 17. Forest fire frequency distribution along the months in 2003 in Czech Republic.

(Source: Ministry of Interior of the Czech Republic MV – GØ HZS ER. Kloknerova 26, P.O. Box 69. CZ – 14801 PRAHA 414)

### 6.3. Latvia

Forested areas (2.931 million ha) account for 44.5% of the Latvia's total land. With 1.23 ha of forest per head of population, which is 4.5 times higher than the average for Europe, Latvia is known as one of the most wooded countries. The forest coverage is increasing, especially in the private sector, mainly due to farmland afforestation. The percentage of public forestland varies from 25% to 60% according to the region.

As a result of the land reform after Latvia regained independence, the forest ownership has substantially changed. At present the Latvian state owns 54.4 % of forestlands, of which 3.7% are under the management of local governments, and 50.7% under the State Stock Company "Latvijas valsts meži". The private owners hold 45% of forests; other ownership forests (church, armed forces) make up 0.6%. According to the data of the State Register of Forests in 2002 the number of registered forest holdings was 117,294. As the privatization still continues, the number of private forest owners is expected to reach 150,000 with the average ownership size of 13.1 ha.

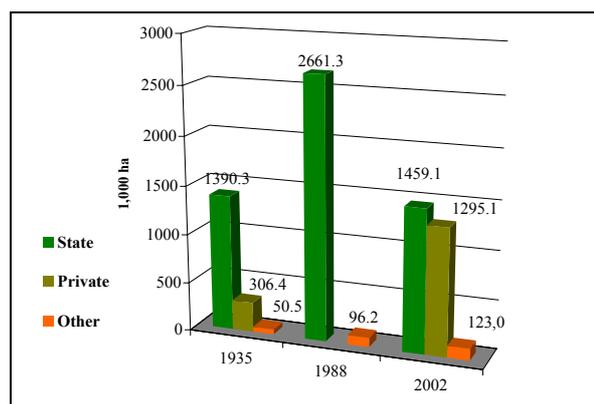


Figure 18. Forest ownership in Latvia

The Ministry of Agriculture is working out the Forest Policy and drafting the related legislative and regulatory acts. The State Forest Service (SFS) with the Ministry of Agriculture is a civil institution of state administration. Implementing the Forest Policy, law enforcement, control over the observance of law in all the country's forests regardless of the form of ownership, including also the forest fire safety and fire control, are the functions of the SFS.

The SFS consists of the Central Office and 26 territorial units – state regional forest districts, which normally coincide with the administrative regions. Every regional forest district headed by the chief forester comprises a number of forest districts (from 4 to 10, or totally 197 for the whole country) headed by the district forester and supervising one or several communities of the respective administrative region. Each forest district includes 4-8 forest ranger districts (totally 833 for the whole country). On the staff of the central office of each regional forest district there is an engineer responsible for forest fire control.

#### *Forest fire protection in Latvia*

Latvia has a network of fire lookout towers, covering the whole country. Being a total number of 186, the fire lookout towers are placed all around the country so that a forest fire can always be seen from at least two towers.

At each regional forest district there is one or several fire stations with all the fire control hardware. During the season of high fire hazard (normally between mid April till October) a fire brigade of 2-3 men is on duty. The SFS has at its disposal 96 fire engines. To provide for efficient fire control during the fire season the SFS employs on a part-time basis about 800 persons (firemen, persons keeping watch on the lookout towers, controllers, etc.). The task of the person on duty is to inform of the smoke detected, its nature and the direction it spreads. The exact locus of fire is determined from two towers, from where the given locality can be seen. The forest district office is immediately informed of the situation and the fire brigade is sent to the place where fire has broken out. So far no airplanes are used in forest fire control because the costs are too high. Besides, the network of roads is quite good and an access by vehicle is possible nearly everywhere. In case of huge fires when an area of about 10 ha or larger is burning, additional forces are invited to put the fire under control – the Fire Safety and Rescue Service of the Ministry of Interior, the National Armed Forces, and the local governments. The SFS has made agreements with these entities for rendering assistance in forest fire control. Sometimes assistance for payment is given also by private businesses and individuals.

The machine pool of outdated fire engines, mainly of Soviet and Russian manufacturing, is at present the most difficult problem for the SFS. About 40 % of fire engines have been in service for more than 15 years. Insufficient funding from the state budget does not allow the SFS to procure modern four-wheel drive engines made in Europe to replace the obsolescent ones. Besides, because of the seasonal nature of jobs in forest fire control the difficulties in recruiting a regular staff of required occupational competence is another problem the SFS has to deal with.

A possibility of giving over the function of forest fire control to the Fire Safety and Rescue Service of the Ministry of Interior to create a national system of fire safety is currently under discussion between the authorities involved. For the SFS it would mean no need to engage seasonal labour during the fire hazard season whilst the operational capacity of the Fire Safety and Rescue Service in the rural areas would become stronger. However, such an approach goes with certain risks. At present the related financial and statistical analyses are made.

### ***Preventive measures***

The forest fire safety regulations set out the rules compulsory for every forest owner, manager, or person visiting forest: restrictions on making bonfires, special regulations in timber harvesting, etc. During the fire season the level of fire hazard in forests is on a daily basis determined by the State Hydrometeorological Agency. This information is submitted to the forest authorities. In case the forest fire hazard is getting too high the local governments can impose a ban on access to forest. Of course, it is difficult to control how the ban is observed.

The execution of fire preventive measures is under the responsibility of the forest owner or manager. Control over implementing the preventive measures is done by the SFS. Mineralized fire lines are one of the most typical fire preventive measures. Such lines are arranged along the highways and railways; sometimes also inside the blocks of conifer stand on the rides between forest compartments. At present new forest fire safety regulations are drafted to be enacted by the end of the year.

### ***Mapping the burnt areas***

The SFS intends by 2006 to complete the work on preparing the forest digital maps at the scale 1:10,000. At present the burnt areas are not marked on forest maps, as there is no practical need for it. There would be no problems of making them by using the GIS software. The data on all the forests are stored in the database “Meža fonds”, including the data on burnt areas. The forest data entered in the database are to the level of sub-compartment, which is 0.1 ha. Provided the forest stand has lost vitality as a result of fire, it is classed among the burnt areas. Under the conditions of Latvia the forest stands in many cases survive after the fire without suffering a substantial damage.

### ***Use of remote sensing in forest fire activities***

Under the conditions of Latvia the use of remote sensing and aerial patrolling in forest fire control activities is believed to be financially unfeasible. The network of fire lookout towers, besides cheaper, is more efficient for this purpose.

### ***Fire statistics***

During the fire season the operative information on forest fires can be found in the SFS homepage: [www.vmd.gov.lv](http://www.vmd.gov.lv).

Each year, when the fire season is over, the statistical data on forest fires are summed up and submitted to the Central Statistical Bureau of Latvia. The data are publicly available.

Over the past ten years the average number of forest fires has increased (see Figure 19). In 2002 Latvia reached a record figure of 1,742 forest fires. In 2003 the number of forest fires recorded is 900. The fact that about 78% of fires are

detected and extinguished in due course with a final burnt area below 0.5 ha proves that the SFS forest fire control system is efficient enough.

In Table 10 the average burned area by a single fire along the years is reported.

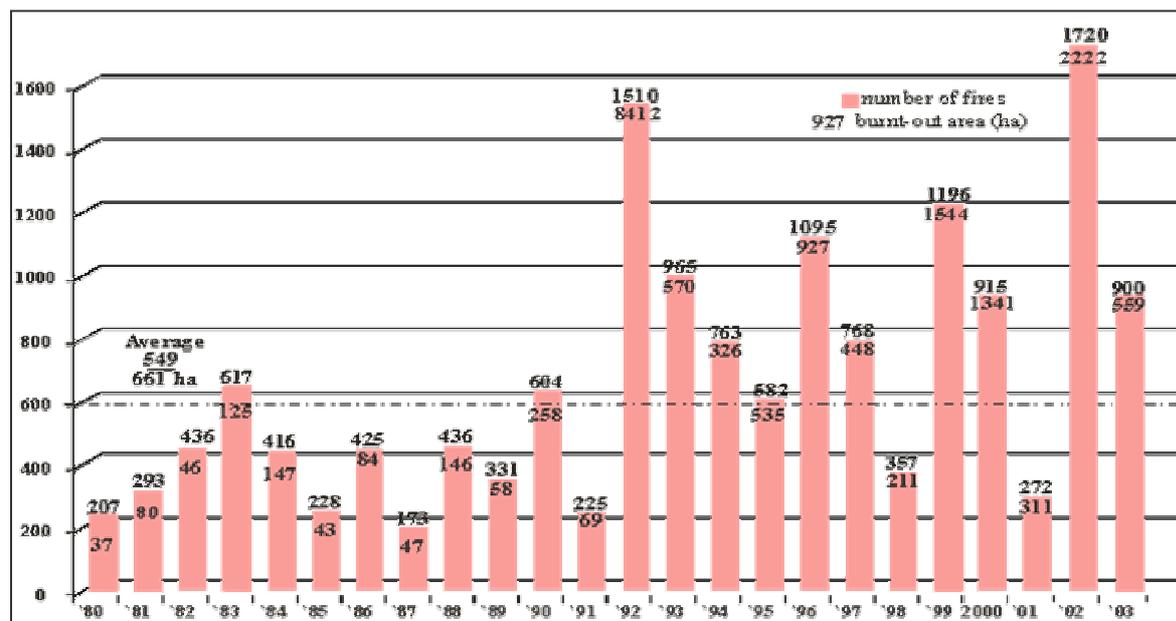


Figure 19. Forest Fires in Latvia in the last 23 years.

Table 10. Average single fire burned area in last 11 years in Latvia

Year	Ha
1993	0.6
1994	0.4
1995	0.9
1996	0.8
1997	0.6
1998	0.6
1999	1.3
2000	1.5
2001	1.1
2002	1.3
2003	0.6

0.5 ha. In 2003 totally 900 fire occurrences were recorded, the total area affected was 559 ha, of which 396 ha of forestland, 48 ha of other wooded lands, and 115 ha of non-forested areas.

Figure 20 shows the frequency distribution of 2003 fires by burned area classes.

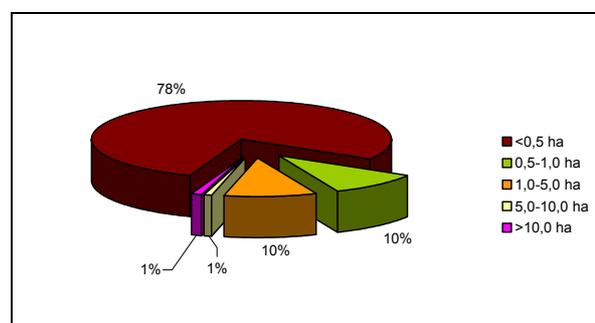


Figure 20. Forest fires by burned area classes in 2003.

### *The 2003 fire campaign.*

In general the 2003 fire season in Latvia should be evaluated as normal. There were no huge fires (with burned area exceeding 50 ha). The average burned area per fire was 0.62 ha, 78% of fires were extinguished before the burned area reached

There were no victims in forest fires.

For the needs of forest fire control, the State Forest Service keeps 186 fire lookout towers, 96 tank trucks, and employs on a seasonal basis about 800 persons, as it was the case in 2003.

(Source: State Forest Service, Latvia)

**6.4. Slovakia**

In Slovakia 852 forest fires occurred in 2003 burning a total area of 1,567 hectares. These fires represent 85.9 % of the total number of forest industry fires in the same year. Compared with the year 2002 the number of fires increased of 232 fires and damages also increased of 41,200 Slovak Crowns (SKK).

In combating forest fires 6,310 people of the Fire and Rescue Corps were involved during 1,071 interventions and the total intervention time lasted 4,352 hours. Total direct material damage represented 29,832,350 SKK, while the saved property value was 389,966,500 SKK. There was no fatal accident; five people were injured.

In combating grass and stubble fires 5,434 people of the Fire and Rescue Corps were involved during 24,349 interventions and the total intervention time lasted 7,577 hours. Total direct material damage was evaluated 6,341 000 SKK; saved property value was 265,428,700 SKK. There was one fatal accident, and six people were injured.

In 32.8% of cases, forest fires were caused by withered grass and bush covers firing. Starting camp fires in nature were reported as fire cause in 31.5 % of cases. Waste and garbage firing were fire cause in 5.8 % of cases.

Forest fires occurred mostly in April (223 fires), in March (141 fires) and in August (125 fires).

The largest number of forest fires (212 events) was recorded in the Žilina region. The greatest damages (4,420,600 SKK) caused by forest fires were recorded in the Prešov region.

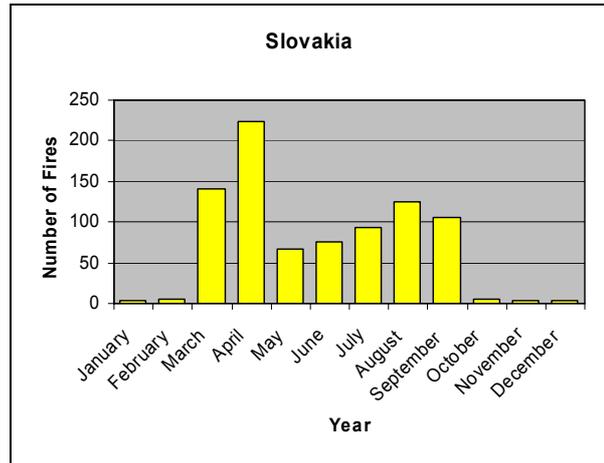
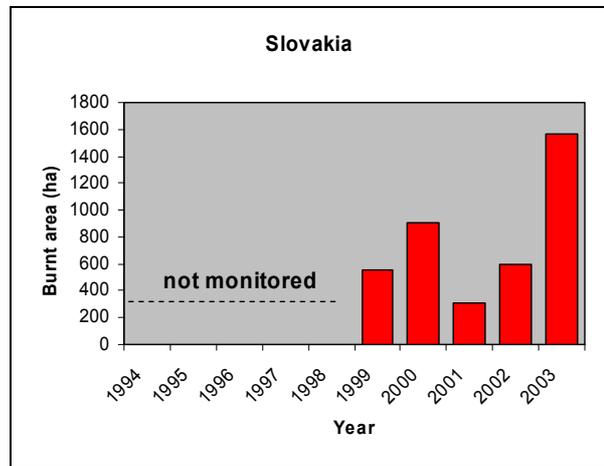
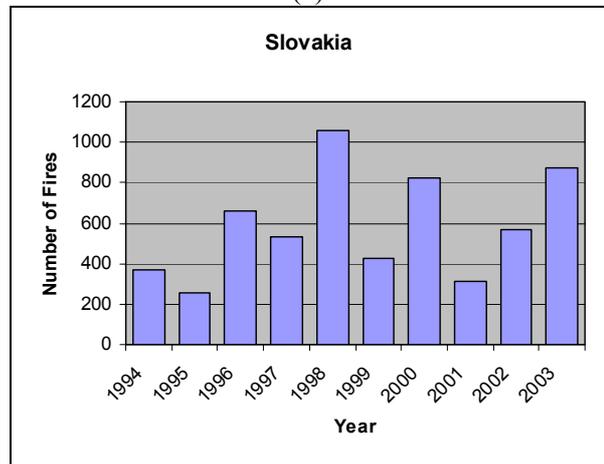


Figure 21. Forest fire frequency distribution along the 2003 in Slovakia.



(a)



(b)

Figure 22. Burnt area and number of fires in Slovakia in the last 10 years.

The material damage caused by forest fires in 2003 was mainly due to the following fires:

- On April 21st, 2003 a fire of mixed forest cover started, burning an area of 7.6 hectares in the municipality area Horná Mičiná, Banská Bystrica district. Owners' association (Urbárske spoločenstvo) of Horná Mičiná

evaluated the damage of 695,000 SKK. The fire cause was intentional arsoning by unknown person.

- On May 4th, 2003 a fire of mixed forest cover started, burning an area of 28 hectares in the municipality area Švedlár, Gelnica district. The owner, Municipal Forest Authority Švedlár (Správa obecných lesov), was lost of 1.3 milion SKK. Fire cause was an open fire handling.
- A huge forest fire with a final area burned of 20 hectares started in the municipality area Východná – part Ondrejcová, Liptovský Mikuláš district on July 17<sup>th</sup>, 2003. The Forest Management Enterprise (Lesný závod) Liptovský Mikuláš evaluated the loss in needle wood cover of 1 milion SKK. The fire cause was camp fire starting in nature.
- On August 6<sup>th</sup>, 2003 a fire of wood cover and windfallen trees started, burning a total area of 4 up to 5 hectares in Spišská Magura Mountains, in the municipality area Slovenská Ves, Kežmarok district. The owners, Military Forests & Lands Kežmarok, Land Association Podmagurie, and companies Budzík & comp. Slovenská Ves and Laufík & comp. Slovenská Ves evaluated damage of 620,000 SKK. The

probable fire cause was an open fire handling.

The list of fire causes and related number of fires reported in 2003 is listed in what follows.

- Withered grass and bush covers firing----- 280
- Starting camp fires in nature ----- 269
- Waste and garbage firing -----50
- Not determined-----38
- Re-ignition of fire -----39
- Smoking -----40
- Open fire handling-----37
- Intentional arsoning by unknown person----30
- Other adults' carelessness -----22
- Children from 6 up to 15 years -----17
- Starting fires in waste dumps ----- 12
- Lighting – structure not protected by lighting-conductor ----- 3
- Electrical short connection ----- 3
- Other monitored reasons----- 4
- Other technical malfunction----- 2
- Malfunction of motor vehicle exhaust or breaking systems----- 2
- Intentional arsoning by convicted person ---- 1
- Military training ----- 2
- Children up to 6 years----- 1

Table 11. Forest fires, damages and accidents in the last 10 years in Slovakia

Year	Number of fires	Burned area in hectares	Direct damage (SKK)	Fatalities	Injured persons
1994	366	not monitored	3 511 700	0	0
1995	254	not monitored	3 754 200	0	3
1996	662	not monitored	33 466 500	0	3
1997	535	not monitored	3 209 300	0	2
1998	1056	not monitored	10 073 100	1	7
1999	426	557	5 085 200	0	0
2000	824	904	385 147 400	6	7
2001	311	305	7 140 700	0	6
2002	570	595	17 395 200	1	2
2003	872	1567	17 436 400	0	2
Total	5856	3928	486 219 700	8	32

(Source: Ministry of Interior of Slovak Republic Presidium of Fire and Rescue Corps. Drieňova 22 826 86 Bratislava. Slovak Republic)

## 7. FIRE SITUATION IN EU CANDIDATE COUNTRIES

### 7.1. Bulgaria

The general fire situation and the description of the forest fire protection organizations in Bulgaria have been described in the Report n. 3 (Forest

Fires in Europe – 2002 fire campaign). Here it is reported an update for the 2003 fire campaign.

Statistical forest fire data of the last 14 years are provided in Table 12. On average it can be seen that there are recorded about 540 forest fires per year and about 11,000 ha of forest territories were affected. Nevertheless it must be noticed that both in 2002 and 2003 the values are below these averages.

Table 12. Forest fire statistics for Bulgaria for the period 1990-2003

Year	Total number of fires	Total burnt area (ha)	Forest area burned (ha)	Other lands burned (ha)	Number of fires per fire causes		
					Human activities	Natural number	Unknown
1990	208	1041	1012	29			
1991	73	511	471	40			
1992	602	5243	4154	1089			
1993	1196	18164	10147	8017			
1994	667	18100	9708	8392			
1995	114	550	527	23			
1996	246	2150	1933	217			
1997	200	595	472	123	51	4	145
1998	578	6967	6060	907	147	6	425
1999	320	8291	4198	4093	84	9	227
2000	1710	57406	37431	19975	385	18	1307
2001	825	20152	18463	1689	187	19	619
2002	402	6513	5910	603	150	7	245
2003	452	5000	4284	716	281	9	162
Average	540	11763	7485	3279	183	10.5	447

During the first six months of 2003 the number of fires was not half of the same period of 2002. There were 169 fires till 30.06.2003, which burnt 767.1 ha of forest territories (168.4 ha of them were unproductive forest lands). The area of the high stem fires was insignificant (27 ha). For the same period of 2002 the numbers were 348 fires and over 6000 ha of burnt forest areas (350 ha of them were from high stem fires). During the months of July, August and September 2003, mainly from irresponsible burning of stubbles and vegetable residuals by the farmers, 253 fires were registered, 4000 ha were burnt, 520 of them as result from high stem fires.

The whole country was shocked from the tragedy, which happened on 24.07.2003 in the area of Betolovoto, State-hunting enterprise (SHE) 'Razlog'. In executing their official duty four honoured Bulgarian men died. Now there is no doubt that the fire was intentionally caused, probably as a reaction to the strengthened control of the forests protection in the area.

Big fires during this period were registered in Regional Forestry Board (RFB) Berkovitsa, State Forest Districts (SFD) Belogradchik and Chiprovtsi, RFB Sliven, SHE Topolovgrad, RFB Kurdjali, SFDs Haskovo, Harmanli, Svilengrad and Kurdjali and others.

During the year two maximums of fire frequencies were clearly delineated, as it is typical for our country. The first of them was in March - April and the second during the summer months

July, August and September. Both of them are mainly connected with burning of stubbles and vegetable residuals by the farmers.

The main reasons for the forest fires during 2003 were the following:

- Carelessness - 249 fires
- Intentionality - 32 fires
- Natural - 9 fires
- Unknown - 162 fires

Most of the unknown caused fires are actually caused by carelessness, but often the colleagues point a big number of the fires causes as unknown. This is a practice from many years and it must be stopped. Nevertheless there are cases when really the reason for a fire cannot be defined.

Almost all the burnt areas are almost in or close to the agriculture fields.

The economic damages for 2003 are estimated in 1,585,000 leva, although it must be noticed that the average damage for the last 13 years has been 13,000,000 leva.

The comparison of burnt forest areas, number of fires and damages for the period 2001-2003 (see Table 12) shows that the number of forest fires in the last two years is similar but the damaged areas has a difference of more than 1500 ha. This means a faster reaction of the colleagues in FEs and SHEs in cause of fire, better cooperation with National Fire and Emergency Safety Service (NFESS), National Service Civil Defense, Municipal administrations and City halls.

### ***The most important measures in the field of protection from forest fires in 2003***

On 12.08.2003 in state gazette 71, by the Minister of agriculture and forests and the Minister of interior the Regulation 30 was published for the conditions and order for performing activities against fires in the forest lands and protecting the forest from fires. It regulates the order and organization for preventing forests from fires and main duties for owners of areas in the forest fund and near by are pointed out. For the protection measures and demands against forest fires are described and the organization and obligations for extinguishing forest fires are clearly elaborated. The Regulation takes into account all the EU directives in the field of forest fires.

With Decision 15 of the MAF Collegium, on 09.12.2003 the final text of the Strategy for preventing the forests from fires was adopted. The main idea of the Strategy is to be a base for a system of officially adopted views, principles and reaches for preparation and organization of activities for preventing forest fires, detect and localize their progress and spreading, successful extinguishing, and overcoming the consequences of them. At the same time, it will be a base for financing by the World Bank.

Very important is the creation of a Council of Department's Coordination (CDC) to help the interaction between the institutions which are involved with the problem and the harmonization of the legislation with EU and its structures. The first CDC session took place on 11.02.2004.

*(Source: National Forestry Board, Ministry of Agriculture and Forests, 55, Hristo Botev Blvd. 1040 Sofia, Bulgaria).*

## **7.2. Romania**

The general fire situation and the description of the forest fire protection organizations in Romania have been reported in the Report n. 3 (Forest Fires in Europe – 2002 fire campaign). Here it is reported an update for the 2003 fire campaign.

From the climatic point of view, the year 2003 was an exception. The most part of the Europe was affected by drought, with high temperatures and deficit precipitation regime. The maximum values of temperature over last 150 years were reached and exceeded in England (38.1°C), in France and Germany (40.4°C), and in Balkans and Eastern Europe (Moldova Republic, Ukraine)

the agricultural crops were partially compromised.

In Romania, after a relatively mild winter, but prolonged until April, starting with May, the thermal regime suddenly became excessively dry. May and June, which, statistically, are the rainiest months during the year, were practically without precipitations. The drought regime took place rapidly and severely.

The drought phenomena recorded mostly in the southern part of Romania was as a result of the lack of precipitations, high temperatures recorded of the air, the groundwater table lowering and the increasing phenomena of rivers drought.

By combining the effects, the meteorological and hydrological droughts were transformed into soil drought; locally this took the shape of severe drought.

The excessive drought determined severe forest fire conditions in Romania during 2003, with resulting damages higher than in 2002, also because in some remote areas of forest few forestry cabanas were ignited.

The drought phenomena ended during August, and the risk of the forest fires became minimal.

The National Forest Administration (ROMSILVA) assured the measures for prevention, and extinction of the forest fires.

As a result of the activities undertaken by the Ministry of Agriculture, Forests, Waters and Environment, the Commandments for limiting the drought effect were activated and supplemented, taking action according with the County and Local Plans for defence against the dangerous hydro-meteorological phenomena.

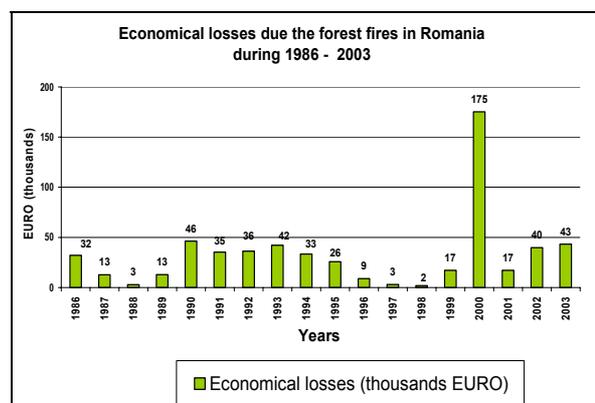


Figure 23. Economical losses due to forest fires in Romania (1996-2003)

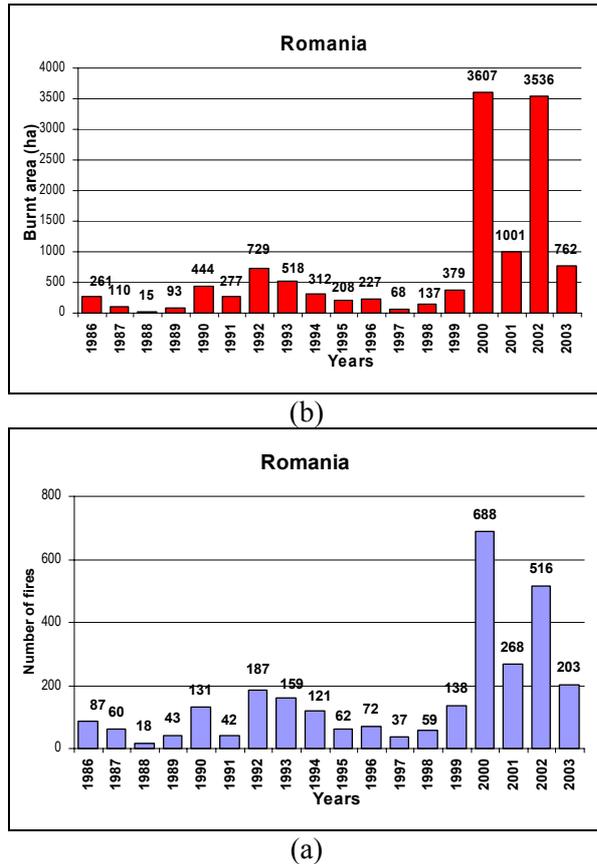


Figure 24. Burnt area and number of fires in Romania in the last 18 years.

(Source: Ministry of Agriculture, Forests, Waters and Environment, Bld. Libertatii no. 12, sect. 5, Bucharest, Romania)

### 7.3. Turkey

Turkey is a country with a land of 77,079 million hectares, of which 20,749 million hectares is forested, representing about 26% of country's total land area. In Turkey, 99 % of the forest land belongs to the State.

An area of 3.5 million hectares of the total land defined as forestland constitute actually pastures while 9 million hectares of the total forestland can be considered productive, the rest are unproductive or degraded lands.

For the other vital sectors, the forests have a function of infrastructures, but the balance worsens continuously.

Land area suitable for afforestation is approximately 25 % of the total and approximately 8 million inhabitants live inside or close to forests in 17,000 villages,

In the fifth five-year plan of development, the objectives defined for the sector are as follows:

a) Protection of natural balance. b) Improvement of natural balance. c) Increase of the role of the forests as a collective benefit.

The forests must thus be planned and managed in this spirit.

The whole of the activities related to the forest is entrusted to the Directorate-General of Forestry (OGM) of the Ministry of the Environment and Forestry. Its role can be summarized as follows:

- Management and exploitation of the State forests;
- Protection of the forests and realization of a forest land register (cadastre);
- Widening of the forests;
- Regeneration, improvement and increase in the productivity of the existing forests;

The General Directorate of Forestry (OGM) is made up of 12 sub directorates and other units of support. There are 27 regional directorates (RD) and 245 forest enterprises functioning under RD. These units manage and exploit 1,325 forest districts.

#### *Fire in the Turkish forests*

In Turkey, about 12 million ha of forested lands representing 60 % of the total forest area are subjected to and under the threat of forest fires. Forest fires are very frequent along coastal zone, 1700 km long and 160 km wide throughout the Mediterranean and Aegean regions. In Turkey, 80% of the fires occur in these zones representing more than 90 % of the annually burned area.

During the period 1937-2002, a total number of 72,316 fires burned over 1.5 million hectares of forest land. This corresponds to averages of 1096 fires and 23,477 hectares burned yearly, with an average burned area per fire of 21 hectares.

Since 1937 the average area burned has steadily decreased passing from 69 ha (in the period 1937-1951) to 6.5 ha in the last decade (see Table 13).

The decrease in the area burned per fire can be attributed to the increased and effective use of technology in transportation, communication and fire suppression. It is interesting to note that 90% of these fires affects less than one half-hectare and constitutes only about 10% of the total area burned.

It is also remarkable the reduction in the burnt forest land during the last period 1993-2001 (6.5%), whereas in 1937-1950 it was 69%.

Table 13. Forest fires between 1937 and 2001

Periods	No of fires	Area burned (ha)	Area burned per fire (ha)
1937-1951	11017	759117	68.9
1952-1961	8122	272455	32.4
1962-1971	5803	94080	16.2
1972-1981	10041	167505	16.7
1982-1991	14216	115853	8.1
1992-2001	21646	140982	6.5

Each year approximately 15,000 to 30,000 ha of forests burn in Turkey, causing enormous ecological and economic damages, as well as losses of human lives. In Turkey, the annual average number of forest fires during the last decade is 2,165 and the area affected is 14,098 ha. The majority of the fires are recorded during the fire season which is summer (see Figure 25).

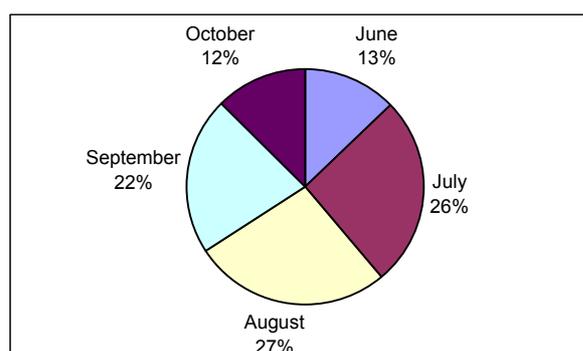


Figure 25. Fire occurrence by months in the fire season.

Forest fires in Turkey seem to occur according to an apparent periodicity: burned surface seems to increase every four years (more or less a year). The cycles of dryness are perhaps related to this phenomenon. Moreover, catastrophic fires are recorded during the years of intensive political activities (national elections each four years, etc).

Forest fires are responsible for very important damages. Each year, the state devotes nearly 65 million EUR to the fight, with the operations of prevention of forests, while the degradation caused by the forest fires costs more than 100 million EUR. The fires destroy also forest landscapes and mediums. These areas constitute invaluable resources which often take very a long time to be reconstituted. It is thus a part of the national heritage that is affected each year by this threat.

### *Causes of forest fires in Turkey*

The majority of forest fires in Turkey are caused by people. People-caused fires account for 96% of all fires, while lightning is responsible for the remaining 4%. Of the people-caused fires 14% are classified as arson, 48% as negligence or carelessness, and 34% as unknown. "Unknown" fires are the fires for which the cause could not be determined. However, it is very likely that the shares of the first two categories of fire causes (i.e., arson, negligence or carelessness) in unknown causes are similar to that of the known causes.

It is difficult to evaluate the results of the prevention activities directed towards negligence, but various symptoms observed in Turkey at the time of the systematic and permanent campaigns allow considering such activities a success in the forest belts most subjected to the influence of the urban populations.

The rural population must be integrated into forest economy. It is necessary to show people, through public awareness campaigns, what are the general benefits that the forest gets, the damages that fire inflicts on the environment and consequently on agricultural and pastoral interests of the people affected. In this regard, it is very advisable to have the rural population taking part in the work undertaken by the administration: plantations, opening of roads, clearing of undergrowth and opening of fire breaks and fuel breaks for fire prevention, fire fighting, etc.

This type of prevention activity must be linked with an analysis of the motivations which lead certain elements of the population to be transformed into ones that start fires. Certain studies reveal that, in certain areas of Turkey where the agricultural and pastoral activities prevail, intentional fires are more frequent where conflicts between groups of the population and the authority exist.

These data do not reflect the reality. Half of the fires allotted to intentional fires are classified among the "unknown ones" just because an obvious proof is not available.

Actually, at least half of the fires is intentional in Turkey and 96 fires out of 100 are an act of men. The most disastrous fires destroyed more than 50% of the forests. This is due to the fact that intentional fires are lit and are propagated in inaccessible places at the time of very bad weather conditions.

Table 14. Causes of forest fires over the period 1992-2001 (10 years).

<i>Fire causes</i>	<i>(%)</i>
1. Negligence	47.6
<i>Agricultural residues</i>	10.5
<i>Cigarette</i>	10.0
<i>Sanitary</i>	0.6
<i>Shepherds</i>	9.2
<i>Picnic</i>	2.9
<i>Tourism</i>	1.0
<i>Power lines</i>	2.5
<i>Others</i>	13.0
2. Arson	13.9
3. Unknown	34.3
4. Natural causes	4.2
<i>Total</i>	100%

However, the main fire cause in Turkey undoubtedly remains, by far, the burnings put by the farmers for agricultural purposes.

The cause above and the cigarette constitute 47 % of the entire "negligence" class; a specific campaign to increase the level of public awareness in rural and urban areas can thus give good results.

The self-ignition of the vegetation being improbable, the single natural cause of the fires is the lightning. The lightning remains a minor cause (3 to 4 % of the cases) in Turkey.

Lastly, forest fires constitute also a threat for human life. There have been 85 victims in Turkey.

### ***Activities of fire fighting***

Generally, fire protection in Turkey is organized according to the traditional scheme: Prevention + Detection + Extinction.

In the field of the prevention, the following actions are taken:

- Education and public awareness campaigns, using the press, the radio and television.
- Law enforcement.

General impression is that these actions are not carried out, so their effectiveness remains limited.

In Turkey, according to statistics, 9 fires out of 10 are due to the man and its activities; the three quarters of the fires with known causes are a result of sheer inadvertence. The training activities, education and sensitizing are thus essential for the prevention.

The primary prevention resides on the information and the education of the public, in particular of the inhabitants, the secondary residents and the tourists. Such activities actually remain insufficient. Without forgetting the farmers, the stockbreeders and the foresters, because in many cases, the traditional activities of the rural world are also important in fire start. Negligence of all kinds accounts for about fifty percent of the fires.

Despite everything, the maintenance of agricultural, pastoral and forest activities constitute the best prevention. The techniques used in these activities are generally manual, and the controlled burning is limited or not enough.

The mechanization of undergrowth clearing does not appear to have progressed more in Turkey.

There does not seem to be an existing financial system that attracts sufficient interest and investment for the cleaning of the forests. In Turkey, there is no private forest, all the forests are publicly owned.

Fire danger rating system is being developed, but currently it is in its infancy. Daily fire danger indices are not systematically calculated, but estimated based on weather data.

### ***Personnel of fight***

In Turkey forest fire organization of fire crews uses teams of semi-professional personnel (approximately 15-20 people), functioning under the forest service (OGM).

The foresters who fight only forest fires and the specialized personnel receive a specific training on fire suppression and the use of fire engines.

For the risk period, the forest service employs approximately 11 seasonal personnel to train the fire brigades / fire crews. After the training, the teams, each composed by 10 to 15 men, set out again in the forest centres. In winter the fire workers do not work.

The population of the forest villages must take part in the fight, under the responsibility of the foresters. It has small equipment such as shovels, beaters. All men between 18 and 50 years can be hired, which represents a potential of 760,000 people all across the country.

### ***Organization and Coordination:***

The PFCI is spring of the Directorate-General of the Forestry. One finds an organization by forest

area parallel with that of the management of the drills (Regional Forest Directorate, Districts and Under-districts).

There is a forest fire command centre which informs the management of regional forest directorates of the level of risk, and ensures the coordination between the forest areas concerned. It distributes the means of the General Directorate of Forestry to the whole of the country.

### ***Air equipment***

Helicopters and planes are very useful in fire control, like tactical support of the troops on the ground or, when the conditions of access to fire are difficult by terrestrial way.

Turkey rents helicopters of Russian origin (MTI), allowing the transport of personnel (15 people) and the water dropping with a capacity of 3,000 litres. This material is rented during 5 months in the fire season.

Currently there are 6 helicopters owned by DGF, 10 helicopters are rented, and 3 helicopters are from military. In addition, there are 15 planes rented and 3 military aircrafts (C-130) for the seasonal fire control.

The helicopters are of great importance especially to direct the operations, but also to drop water on fires with a special bucket. In Turkey, since 1986, helicopters have been used to transport teams of 6 to 15 men with their equipment. This has made it possible to strongly reduce the time of initial attack and its efficiency.

### ***The fire database***

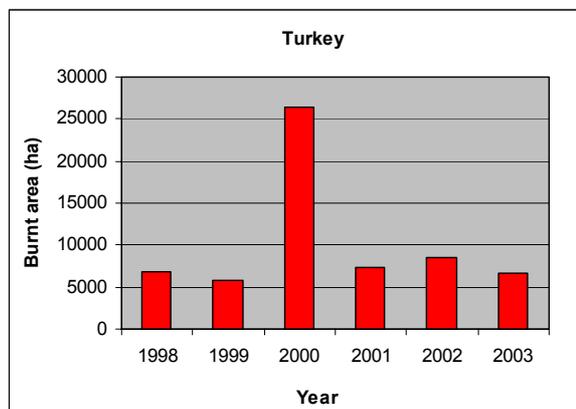
Each fire is recorded on forms at the level of the Under-district which then go up the hierarchical levels until the Directorate-General of the Forestry, where they are stored in data-processing format.

As a whole, 4 types of form can be filled for the same fire:

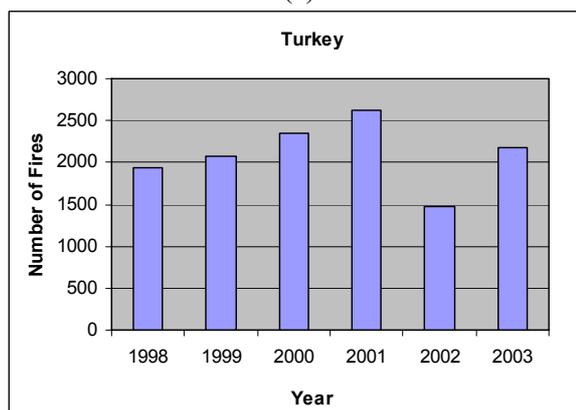
- the first form reports on the start of the fire.
- the second form gives the detail of the development of the fire for every 6 hours, until the fire has been put under control.
- the third form shows the characteristics of the fire when the fire has stopped.
- the last form, called fire report/ratio of drill, synthesizes all information; it is the final version, which will be entered into the statistical data base.

Two databases exist:

- an operational database, allowing the analyses of the course of operation of fire control and interventions. It is carried out starting from the first three forms.
- a statistical database, established starting from the synthetic form.



(a)



(b)

Figure 26. Burnt area and number of fires in Turkey in the last 6 years.

### ***The 2003 fire campaign***

During 2003 a total number of 2177 fires occurred burning a total area of 6,644 hectares.

As far as the fire fighting means, all along the year they were used fire trucks (645), graders (128), dozers (137), vehicles (366), trailers (99), motorcycles (417).

The air equipment for extinguish was composed by 3 military aircrafts (C-130), 6 helicopters, 3 helicopters from military. In addition 10 helicopters and 15 planes were rented.

During the 2003 there were 7 deaths from forest fires.

Operations of mutual assistance with other countries were underpinned through a cooperation started with Greece on forest fires in 2003.

Fire statistics of the time period 1998-2003 are reported in Figure 26.

*(Source: General Directorate of Forestry. Forest Protection Department. Ankara - Turkey)*

## 8. APPLICATIONS OF ADVANCED METHODS

The European Commission set up in 1997 a research group to work specifically on the development and implementation of advanced methods for the evaluation of forest fire risk and for the estimation of burnt areas in the European Union. This group is currently working as part of the Institute for Environment and Sustainability of the European Commission Directorate-General Joint Research Centre (DG JRC). Since 1998, collaboration has been established with the relevant services of Member States, and under the coordination of DG ENV Civil Protection, aiming at developing a European Forest Fire Information System (EFFIS). EFFIS should not only contain the information derived through the advanced methods presented on this chapter, but it should also contain all the national data that the Member States are collecting through the national forest fire programs. The development of EFFIS will be possible as part of the new council regulation for the protection of forests, in which forest fires is one of the important aspects.

Indicators of forest fire risk were normally developed at the local or national levels. Until recently no mechanisms existed to estimate the risk of forest fires at the EU scale. As mentioned in the previous bulletins, the work at DG JRC has focused both on the development of systems to provide forest fire risk forecast on the basis of existing fire risk indices, and on the development of new integrated forest fire risk indicators. All these indices allow a harmonized evaluation of the forest fire risk situation in Europe during the fire campaign. As requested by the Member States, since 2002 the fire campaign has been extended to 6 months. Consequently, the evaluation of forest fire risk in EFFIS started on the 1st of May, 2003, and ended on the 31st of October, 2003. Forest fire risk maps were computed and transmitted to the relevant services in the Member States and the European

Commission via the European Forest Fire Risk Forecasting System that is part of EFFIS.

In the second part of this chapter the evaluation of the forest fire damages in Europe is performed. This evaluation is based on the damage caused by fires larger than 50 ha, which corresponds, on average, to 75% of the yearly burnt area in Europe.

In addition to the evaluation of fire risk, DG JRC initiated an activity to estimate the annual damage caused by forest fires in southern EU. Modern methods, based on satellite remote sensing and geographic information analysis, are used for this purpose. This activity produced the first cartography of forest fire damages in southern EU in 2000. Since then, cartography of all the burned areas larger than 50 ha is produced every year through the processing of satellite imagery. Further to the mapping of burnt areas, the analysis of which types of land cover classes were affected by fires is performed. All the information is stored in a system referred to as the European Forest Fire Damage Assessment System (EFFDAS).

Other modules, under development within EFFIS, will look into other aspects of forest fires such as vegetation regeneration after the fires, estimation of forest fire emissions, and the identification of post-fire risk areas that may be subject to further damages such as soil loss and/or landslides.

In addition a new module for the fast appraisal of fire damages will also be introduced during the 2004 campaign. This analysis will be performed using satellite imagery with a ground spatial resolution of about 250 meters for all fires of at least 100 ha. The evaluation of damages will be performed twice during the fire campaign: at the end of July and at the end of September.

### 8.1. The European Forest Fire Risk Forecasting System (EFFRFS): Evaluation of the 2003 Campaign

The European Forest Fire Risk Forecasting System (EFFRFS) was developed in support of the EC Directorate General Environment and the relevant forest fire-fighting services in the EU Member States. Since 2002, under request of the Member States, the operation of the EFFRFS was extended to 6 months, therefore starting the 1<sup>st</sup> of May and ending the 31<sup>st</sup> of October. The methods to compute fire risk were still the same seven methods that were used in previous years,

including the Fire Potential Index introduced in 2001.

The 2003 European summer fire campaign was characterized by extreme weather conditions that resulted in one of the most severe fire seasons experienced during the last decades in Southern Europe.

Extreme fire weather conditions were primarily met in the Western sectors of the European Mediterranean Countries where, especially in Portugal, extreme fire conditions resulted in a

number of exceptionally large uncontrolled fires that destroyed an important part of its landscape.

Two major peaks of fire activities occurred in the South-western sectors, roughly in the first half of August and the first half of September. Maps of the Canadian Fire Weather Index from EFFRFS show clearly the high fire danger conditions in such areas at the beginning of August and in the first half of September, that decreased significantly in the second half of September (Figure 27).

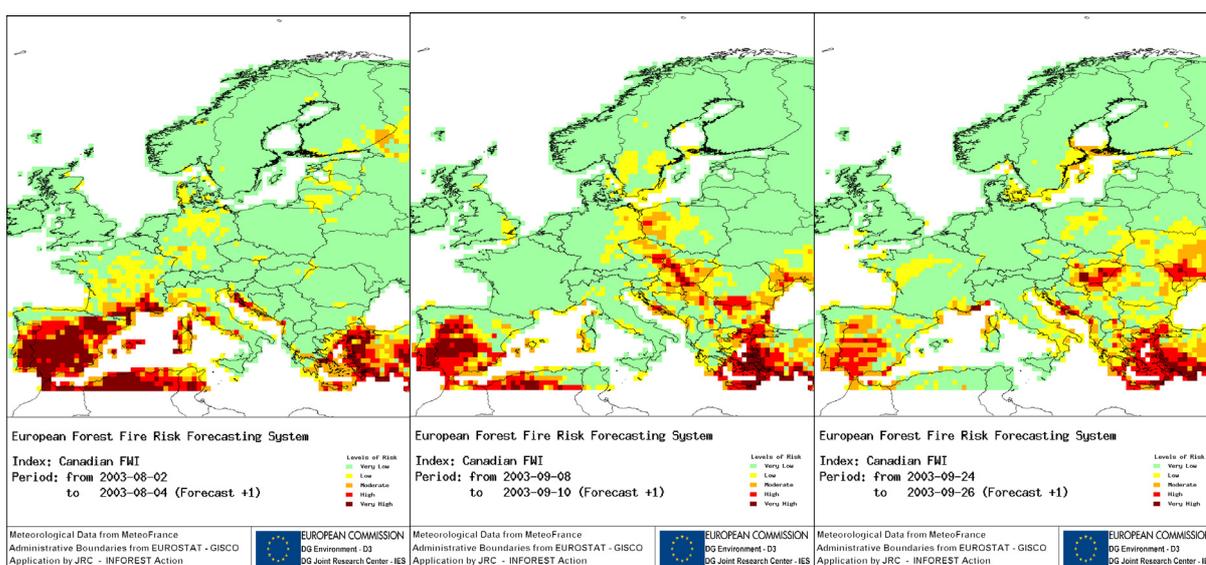


Figure 27. Three days averages of forecasted (day+1) Canadian Fire Weather Index values. LEFT: 2-4 August averages. MIDDLE: 8-10 September averages. RIGHT: 24-26 September averages.

In France summer 2003 has been by far the worst fire season of the last decade also due to very high fire risk conditions with two major peaks of fire activity at the end of July and at the end of August (see Figure 28).

Spain and Italy were also strongly concerned, although as a whole within the average conditions of last years. Nevertheless significant anomalies were observed in Italy in terms of the spatial distribution of the fire risk, with important fire activities also in the Northern regions, where the events are usually concentrated in winter-spring months, and during the summer the risk level is typically very low.

Greece has confirmed the relative low incidence forest fires of 2002 in comparison with previous years.

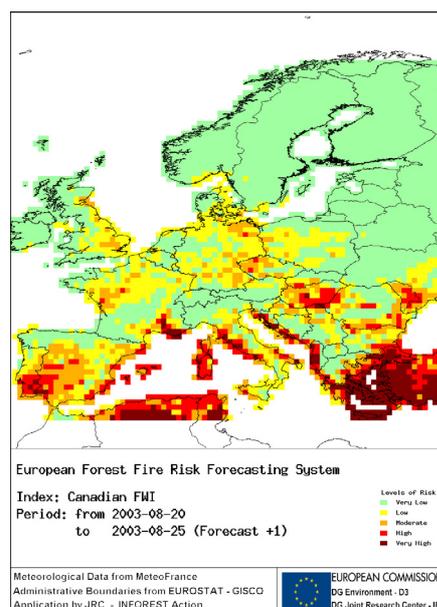


Figure 28. Forecasted (day+1) Canadian Fire Weather Index values. Averages 20-25 August

The weather conditions exceptionally hot and dry of summer 2003 have determined a unusually high fire risk level with a strong increase of forest fires occurrences and burnt areas in all northern Member States.

In Figure 29 the evolution along the 2003 fire campaign of the average values of the Canadian Fire Weather Index (FWI) in some Member States is shown (weekly averages). The last 3 years can be compared, nevertheless it must be taken into account that weekly averages of an entire country tend to flatten the peaks of fire risk, that are therefore less evident. Finally in Figure 30 the maps of the monthly averages of FWI across Europe are shown.

Very positive feedback has been confirmed from the Member States asking for the continuation and the improvement of the EFFRFS as part of the European Forest Fire Information System. Collaboration with the operational meteorological services in the Member States has been consolidated in order to improve the performances of the EFFRFS also by integrating additional data sources. This dialogue with users and other stakeholders should lead to an operational service for civil protection and forest fire services across Europe. This work contributes to the EU's aim of providing environmental information and services that can be aggregated to other existing global environmental information products in support of the Global Monitoring for Environment and Security (GMES) initiative.

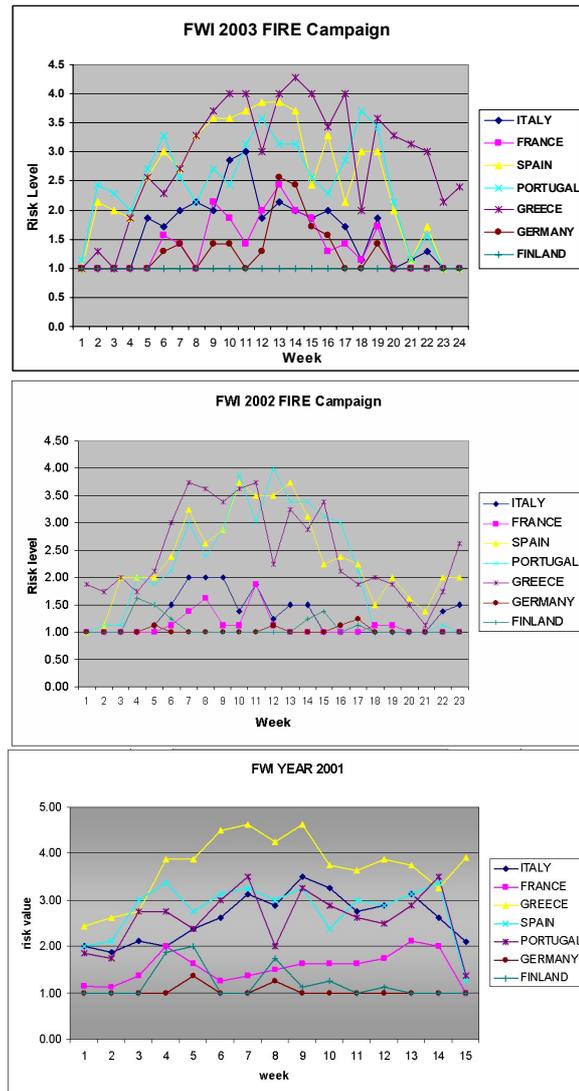


Figure 29. Evolution of fire risk as determined by the Canadian Fire Weather Index (FWI) in the last 3 years (2001 to 2003).

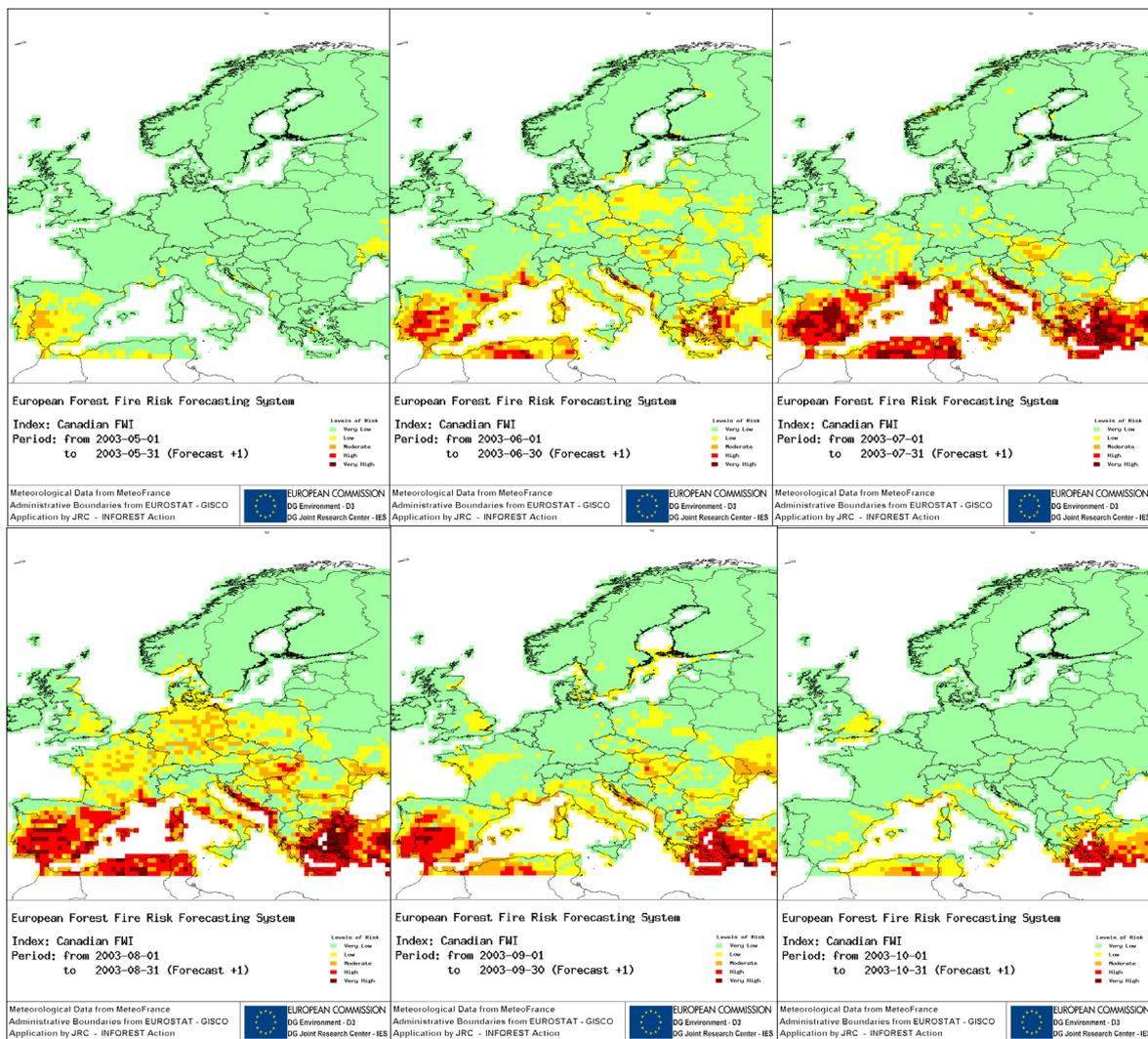


Figure 30. Evolution of the monthly fire risk in the European Union as determined by the Canadian Fire Weather Index.

## 8.2. The European Forest Fire Damage Assessment System (EFFDAS): Evaluation of the 2003 Campaign.

The information on areas burned by fire at the European level is normally aggregated at administrative level and ignores the exact spatial location and extent of fires. There are two facts that prevent a thorough analysis of the impact of forest fires in the EU. On the one hand each country has its own methodology to assess burned areas, which leads to the lack of harmonization of the burned area statistics and the impossibility to compare fire damages from region to region. On the other hand, although the extent of burnt areas is estimated, no cartography of these is produced. Only the mapping of very large fires is carried out in some countries. Exception is made for Portugal, where the Forest Services have mapped the burnt areas using Landsat TM satellite imagery since 1990 until 1999 (Pereira and Santos, 2003).

In order to improve the harmonization of burnt area data and statistics a map of burnt areas is derived from the classification of satellite images acquired at the end of the fire season (usually, end of September or October every year). This burnt area map is further used in conjunction with the EU-CORINE land cover (CLC) database to estimate the damage to forests and other land cover types. It should be noted that due to the fact that the CLC data is around 15 years old the statistics on the distribution of burnt areas by land cover should be considered indicative. The availability of the CLC 2000 in the near future should provide more reliable information.

The methodology has the advantage of giving fast up to date evaluations of the burned areas after the end of the fire season. It also provides a harmonized system that permits the comparison of fire damages between the different regions of the European Union. The satellite imagery used is acquired by the Indian IRS satellite. This type of satellite imagery presents a ground resolution of 180 meters which permits detailed mapping of fires of at least 50 ha. Traditionally, mapping of burnt areas has been performed with low spatial resolution satellite imagery acquired by the NOAA Satellites, which only permitted the mapping of burnt areas larger than 1000 ha. However, in the case of the EU, fires larger than 1000 ha represent only the 15% of the area that is burnt every year. Therefore, in order to derive accurate maps of burnt areas of at least 50 ha, the medium spatial resolution provided by the IRS

satellite (180 meters) was selected. Burned areas of at least 50 ha account, in these 5 Mediterranean countries, for 75 % of the total area burnt every year. The EFFDAS produced already the cartography of forest fire damages in the south of the EU for the years 2000, 2001, and 2002, and it is being currently validated.

Also in the year 2003, the fires of at least 50 hectares were mapped. The evaluation of each of the five Mediterranean countries is presented in the following paragraphs.

The area burned in 2003 by fires larger than 50 ha, as detected by the analysis of the satellite imagery, resulted in a total surface of 423754 hectares (Table 15). Based on a statistical model built using the Common Core fire database from 1985 until 2001, the total area burned, including fires smaller than 50 ha, would be estimated from these data as 552012 ha, bearing in mind however the lack of information on winter fires and cloud cover problems.

Table 15. Burnt areas in fires larger than 50 ha.

Country	Surface burned (ha)
Portugal	295532
Spain	66148
France	42780
Italy	19135
Greece	159
Total	423754

### 8.2.1. Portugal

Portugal was the State that suffered the most detrimental damages during summer 2003. A number of exceptional large uncontrolled fires destroyed an important part of its landscape. Results show that this was by far the worst forest fire season faced in the last 23 years.

The analysis performed on satellite imagery at the JRC has resulted in an estimate of 295532 ha burnt by fires larger than 50 hectares. This figure is much larger than the average for the last 24 years (107704ha). Based on a statistical model built using the Portuguese fire data from 1985 until 2001, the total area burned would be estimated from these data as 346826 ha. Nevertheless it must be taken into account that in 2003 we are by far out of the range of burned areas occurred during the time series considered for building the statistical model itself, therefore such estimate has to be considered for this year purely a general trend indication.

The intersection of the burned area map with the CORINE land cover database provided the information on the land cover classes that burned. Table 16 presents the damage assessment. It can be observed on this table that the burnt areas were mostly forest and semi-natural areas, although the agricultural areas burnt are significant.

Table 16. Distribution of burnt areas by land cover class in Portugal.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	198	0.1
Agricultural Areas	49820	16.9
Forests and Semi-natural Areas	244725	82.8
Wetlands	435	0.1
Unclassified	354	0.1
Total	295532	100.0

Figure 31 presents the fires that were detected on the satellite imagery. Burnt areas are shown in red over a color-composite of the satellite images. The most affected area was the Centre but also the South of Portugal.

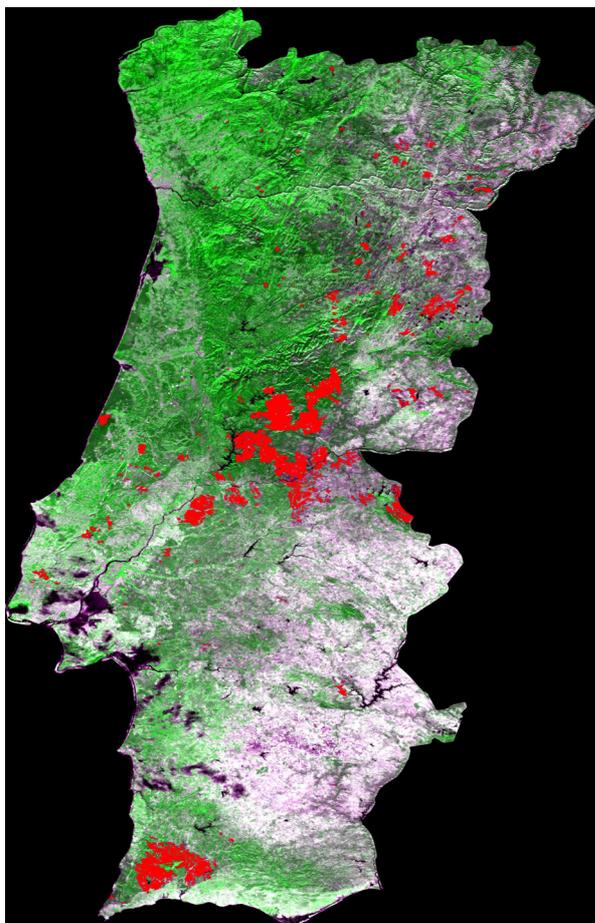


Figure 31. Surface burned by forest fires in 2003.

### 8.2.2. Spain

The time sequence of extreme fire activity in Spain was similar to that of Portugal, although in this case the fire severity was less critical, even though still remarkable. Forest fire damages in Spain of at least 50 ha increased in relation to year 2002. The analysis performed on satellite imagery at the JRC has resulted in 66148 ha burnt by fires of at least 50 hectares. Considering that these are just the fires of at least 50 ha, and applying the statistical model built for Spain using fire data from 1985 until 2001, the total area burned in Spain was estimated to be 107929 ha.

The North and Centre-West part of Spain was one of the most affected areas as show on Figure 32. However, largest fires took place in other regions, such as Catalonia.

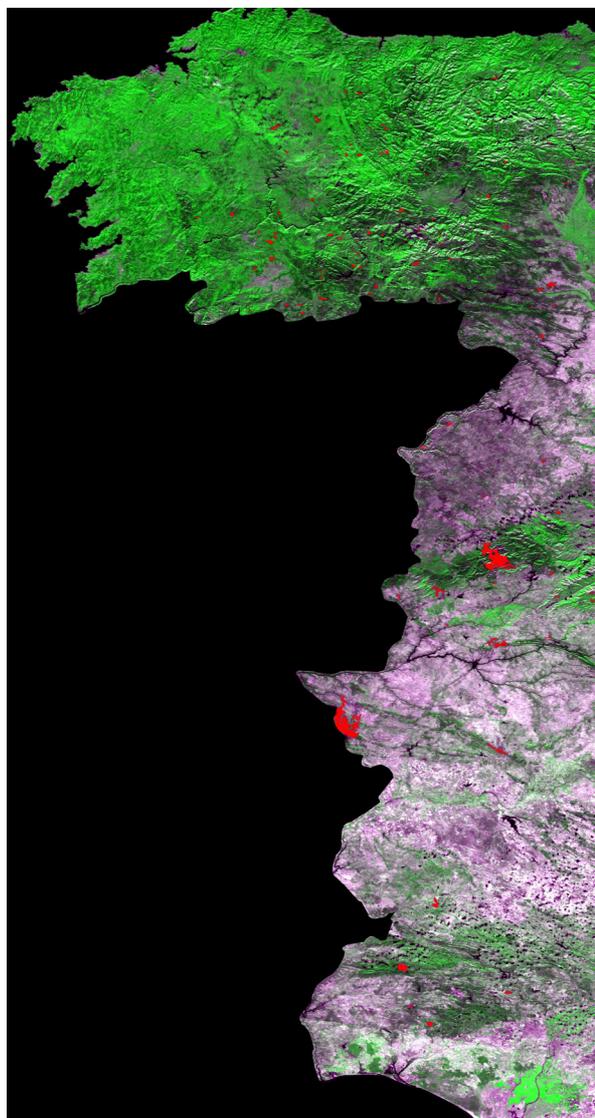


Figure 32. Surface burned by forest fires in North and Centre-West Spain

The intersection of the burned area map with the CORINE land cover database provided the information on the land cover classes that burned.

This distribution (Table 17) shows some important burnt areas were extended into agricultural areas.

Table 17. Distribution of burnt areas by land cover class in Spain.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	111	0.2
Agricultural Areas	7928	12.0
Forests and Semi-natural Areas	57709	87.2
Wetlands	44	0.1
Unclassified	356	0.5
Total	66148	100.0

### 8.2.3. France

In France summer 2003 has been by far the worst fire season of the last decade and it can be considered among the worst ones of the last 20 years. Large fires occurred in Southern France (especially in the Department of Var) and the island of Corse.

The analysis performed on satellite imagery at the JRC has resulted in 42780 ha burnt by fires of at least 50 hectares. Based on the regression model built for France, the total burned area estimated was 49474 ha. The damage assessment performed using the CORINE landcover database is presented in Table 18. It can be observed on this table that the vast majority of burnt area was concentrated on forest and semi-natural areas.

Table 18. Distribution of burnt areas by land cover class in France.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	330	0.8
Agricultural Areas	1647	3.8
Forests and Semi-natural Areas	40798	95.4
Wetlands	5	0.0
Unclassified	0	0.0
Total	42780	100.0

One of the regions that presented high forest fire damage was the south-east of France. Figure 33 presents the fires that were detected on the satellite imagery. Burnt areas are shown in red over a colour-composite of the satellite images.



Figure 33. Surface burned by forest fires in south-west of France

### 8.2.4. Italy

Unlike the other Mediterranean countries, the area burned represented by fires of at least 50 ha in Italy is only around 52%. This fact next to the unavailability of good cloud free images led to a high underestimation of burnt areas as detected from satellite imagery. Being so, the analysis of burnt area through the use of satellite images resulted in only 19135 ha, which is way below the figure reported by the *Corpo Forestale dello Stato* of 91803 ha. However, based on the regression model built for Italy, the total burned area, including fires of less than 50 ha extent, can be estimated in 65,460 ha.

The damage assessment was performed using the CORINE land cover database and is presented in Table 19. This analysis shows that the burnt areas were mostly forests and semi-natural areas although an important part of agricultural areas was also affected.

Table 19. Distribution of burnt areas by land cover class in Italy.

CORINE land-cover class	Burned area (ha)	(%) of total burned area
Artificial Surfaces	43	0.2
Agricultural Areas	4647	24.3
Forests and Semi-natural Areas	14434	75.4
Wetlands	3	0.0
Unclassified	8	0.0
Total	19135	100.0

A region that suffered a fairly large number of fires was Sardinia in southern Italy. This is the area shown in Figure 34.

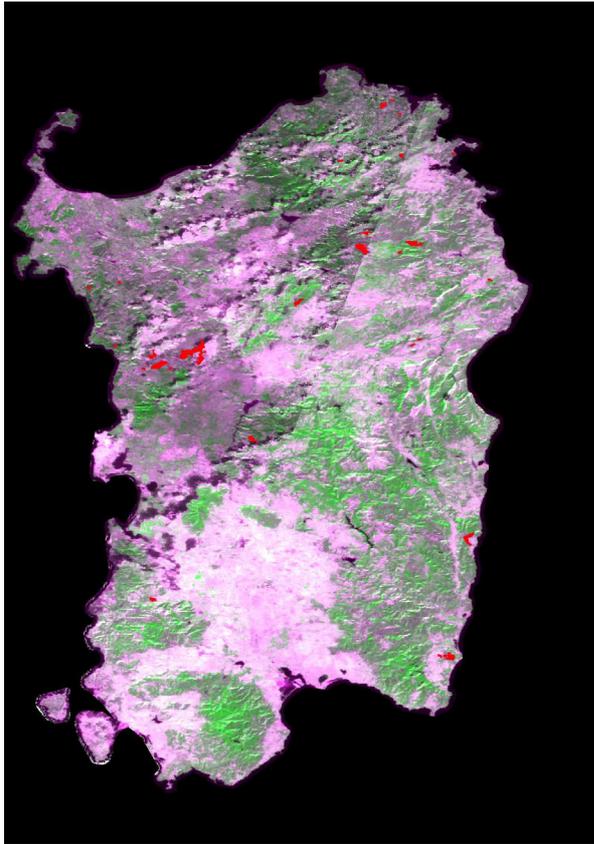


Figure 34. Surface burned by forest fires in Sardinia.

#### 8.2.5. *Greece*

The damage caused by forest fires of at least 50 ha in Greece in 2003 was low for the third consecutive year. The analysis of satellite imagery for the detection of burnt scars for those fires of at least 50 ha resulted in only 159 ha. This estimate is bay far below the estimate provided by the General Secretariat for Forest and the Natural Environment of Greece (3517) and is due to the very small size of the fires occurred in Greece during 2003. Due to the insignificant burnt area detected no further statistics or images are presented.

## **9. BACKGROUND DOCUMENTATION**

European Communities, 2001, Forest Fires in southern Europe: Bulletin of the 2000 fire campaign, SPI 01.85, p. 8.

European Communities, 2001, Forest fires in southern Europe: Report No. 1, July 2001, SPI 01.95, p. 40.

European Communities, 2002, Forest Fires in Europe: 2001 fire campaign, SPI.02.72, p. 27.

European Communities, 2003, Forest Fires in Europe: 2002 fire campaign, SPI.03.83, p. 35.

Pereira, J.M.C. and Santos, M.T., N. (2003) Fire Risk Mapping and Burned Area Mapping in Portugal, Direcção Geral das Florestas, Lisboa, p. 64.



## 10. ANNEX

**Table 20. Burnt wooded area in the Southern Member States (period 1980 – 2003)**

Year	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
1980	44260	263017	22176	144302	32965	506720
1981	89798	298288	27711	229850	81417	727064
1982	39557	152903	55145	130239	27372	405216
1983	47812	108100	53729	223728	19613	452982
1984	52713	165119	27202	78326	33655	357015
1985	146255	484476	57368	189898	105450	983447
1986	99522	264887	51860	86240	24514	527023
1987	76268	146662	14108	120697	46315	404050
1988	22435	137734	6701	186405	110501	463776
1989	126235	426693	75566	95161	42363	766018
1990	137252	203032	72625	195319	38594	646822
1991	182486	260306	10130	99860	13046	565840
1992	57012	105277	16607	105695	71410	356001
1993	49963	89331	16695	209314	54049	419288
1994	77323	437635	25872	68828	57908	667566
1995	169612	143468	18118	46466	27202	404882
1996	88867	59814	11210	57986	25310	243198
1997	30535	98503	20500	103015	52373	304926
1998	158369	133643	20880	140432	92901	565296
1999	70613	82217	17605	61989	8289	251473
2000	159604	188586	23700	114648	145033	631571
2001	112158	66075	17000	76427	18221	289881
2002	124411	107472	20850	40768	6013	299514
2003	421835	149224	74000	91803	3517	740379
	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
Yearly Average(1980-1989)	74486	244788	39157	148485	52417	559331
Yearly Average(1990-1999)	102203	161323	23024	108890	44108	442529
Yearly Average 1980-2003	107704	190519	31557	120725	47418	499164
TOTAL	2584895	4572462	757358	2897396	1138031	11979948
Percentage of total (2003)	57.0	20.2	10.0	12.3	0.5	100.0

Source: European Commission, DG Agriculture and Member States: Direcção Geral das Florestas, Portugal; Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Div XII, Italy; General Secretariate for Forests and the Natural Environment, Greece.

**Table 21. Number of forest fires in the Southern Member States (1980-2003)**

Year	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
1980	2349	7190	5040	11963	1207	27749
1981	6640	10878	5173	14503	1159	38353
1982	3567	6545	5308	9557	1045	26022
1983	4503	4791	4659	7956	968	22877
1984	6377	7203	5672	8482	1284	29018
1985	7218	12238	6249	18664	1442	45811
1986	4348	7570	4353	9388	1082	26741
1987	6977	8670	3043	11972	1266	31928
1988	5643	9247	2837	13558	1898	33183
1989	20155	20811	6763	9669	1284	58682
1990	10745	12913	5881	14477	1322	45338
1991	14327	13530	3888	11965	858	44568
1992	14954	15955	4008	14641	2582	52140
1993	16101	14253	4765	15380	2406	52905
1994	19983	19263	4633	11588	1763	57230
1995	34116	25828	6545	7378	1438	75305
1996	28626	16771	6400	9093	1508	62398
1997	23497	22319	8000	11612	2273	67701
1998	34676	22445	5600	10155	1842	74718
1999	25477	18237	5170	7235	1486	57605
2000	34109	24312	5600	10629	2581	77231
2001	26942	19631	4103	7134	2535	60345
2002	26488	19929	900	4594	1141	53052
2003	20864	18628	4100	9697	1452	54741
	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	EU
Average 1980-1989	6778	9514	4910	11571	1264	34036
Average 1990-1999	22250	18151	5489	11352	1748	58991
Average 1980-2003	16612	14965	4945	10887	1576	48985
TOTAL	398682	359157	118690	261290	37822	1175641
Percentage of total	38.1	34.0	7.5	17.7	2.7	100.0

Source: European Commission, DG Agriculture and Member States: Direcção Geral das Florestas, Portugal; Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Spain; Ministère de l'Agriculture, France; Corpo Forestale dello Stato, Div XII, Italy; General Secretariate for Forests and the Natural Environment, Greece.



**EUROPEAN COMMISSION**

FOREST FIRES IN EUROPE – 2002 fire campaign –  
Official Publication of the European Commission  
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In the frame of the INFOREST action, the Institute for Environment and Sustainability of the Joint Research Centre (JRC) of the European Commission is working to the creation of the European Forest Fire Information System (EFFIS). Together with the relevant services of the Member States, and coordinated by the Civil Protection and Environmental Accidents Unit of the European Commission Directorate General of Environment, the JRC edits the yearly report of each fire campaign. It is not the scope of the report to make comparison among the different data sources, but to provide a comprehensive overview of the forest fire situation in Europe.

Further information on advanced methods can be found in the prototype site of the EFFIS at:

<http://inforest.jrc.it>