HELLENIC AGRICULTURAL ORGANIZATION - DEMETER

First General Assembly & 2nd MC meeting

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FIRE links

The catastrophic fire of July 2018 in Greece and the Report of the Independent Committee that was appointed by the government to investigate the reasons for the worsening wildfire trend in the country

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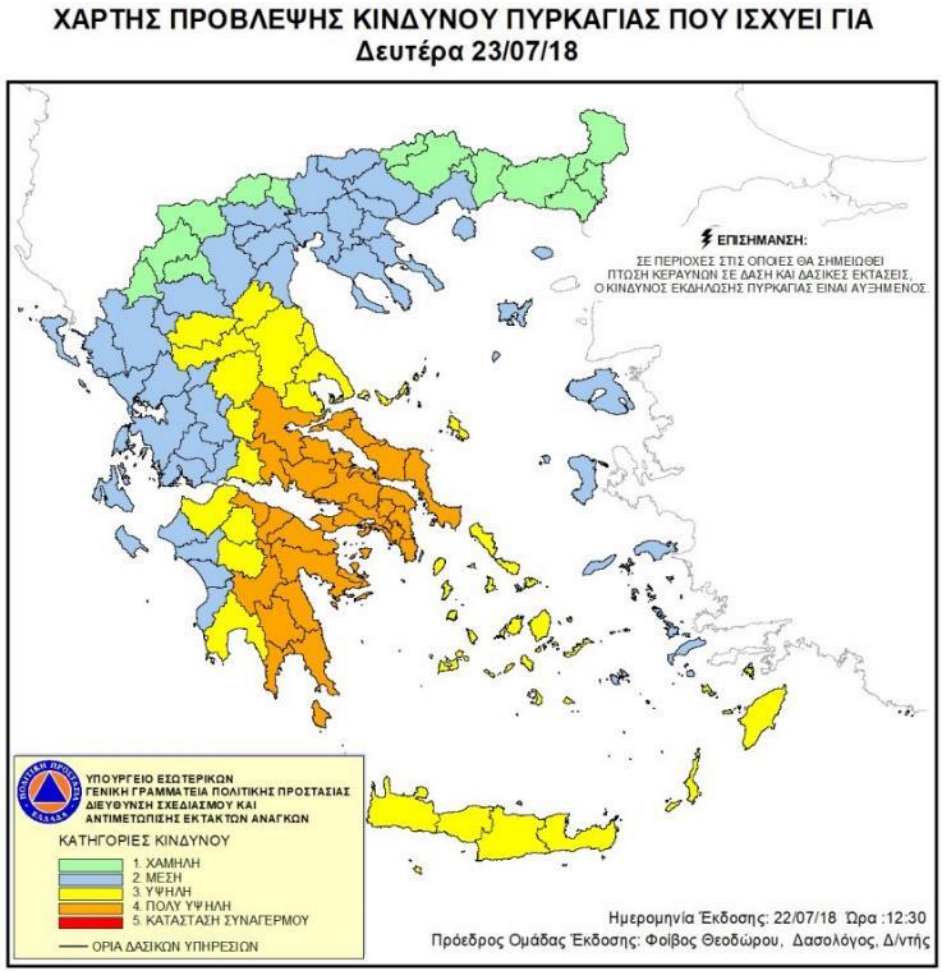
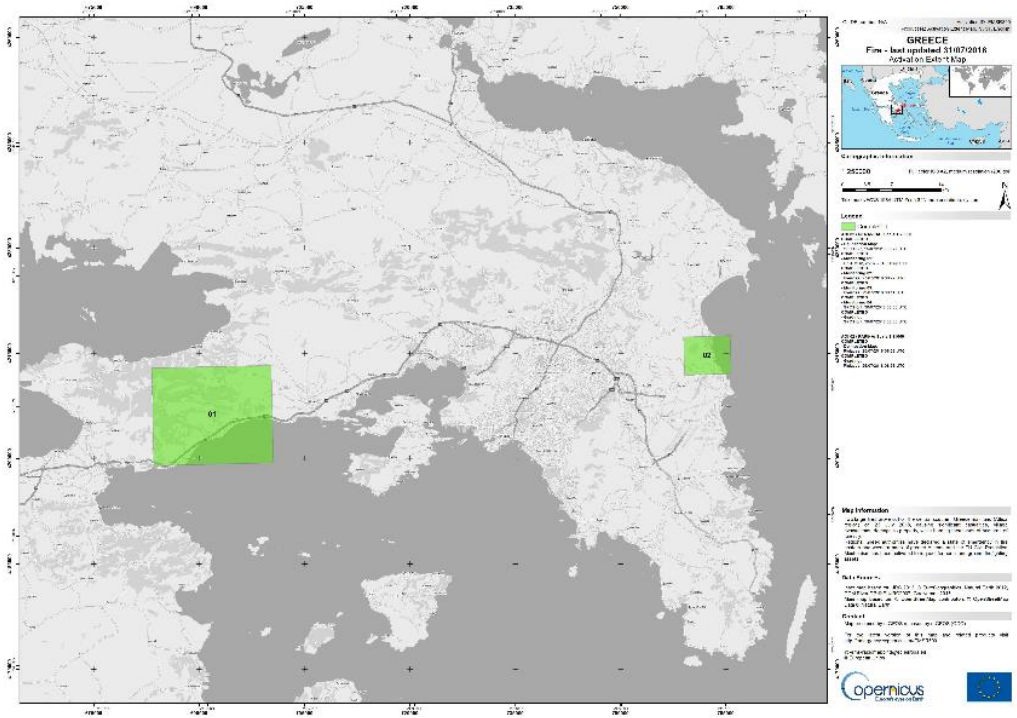
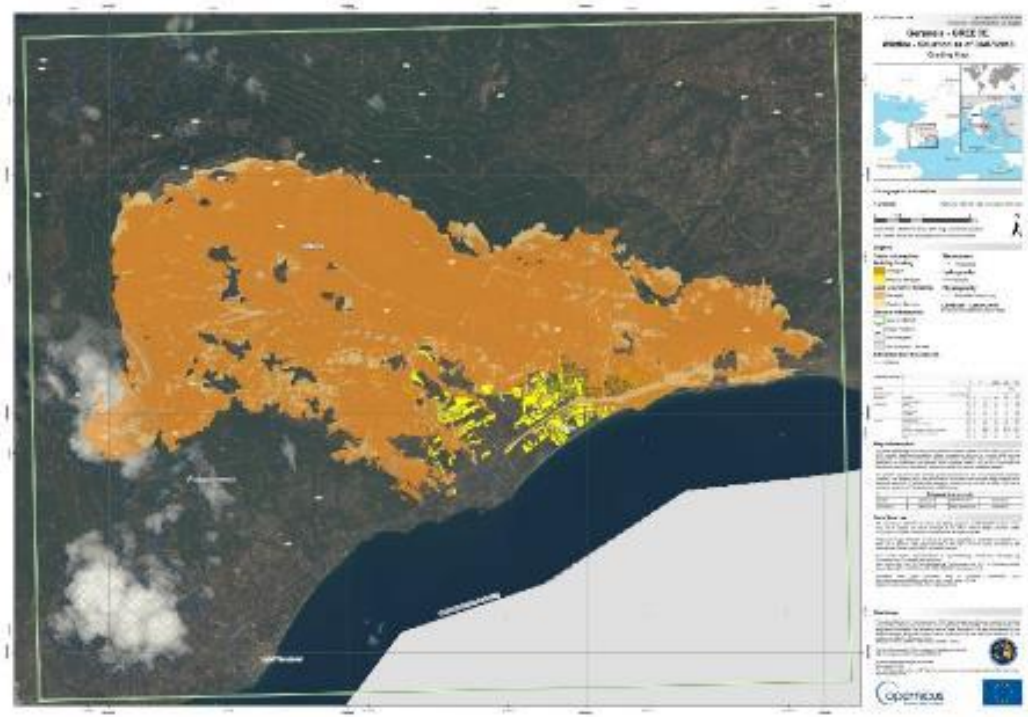
The forest fire disaster in Attica, Greece, on 23 July, 2018

The situation on July 13, 2018 in Attica

- On 13 July 2018, at 16:41, a wildfire broke out on the eastern slopes of Penteli mountain, 20 km NE of the center of Athens and 5.2 km from the eastern coast of Attica.
- This happened on a day with very high fire danger predicted for Attica due to an unusually strong westerly wind, and while another wildfire, that had started earlier near the town of Kineta in west Attica, 50 km west of the center of Athens, was burning in full force, spreading through the town and threatening the largest refinery in the country.





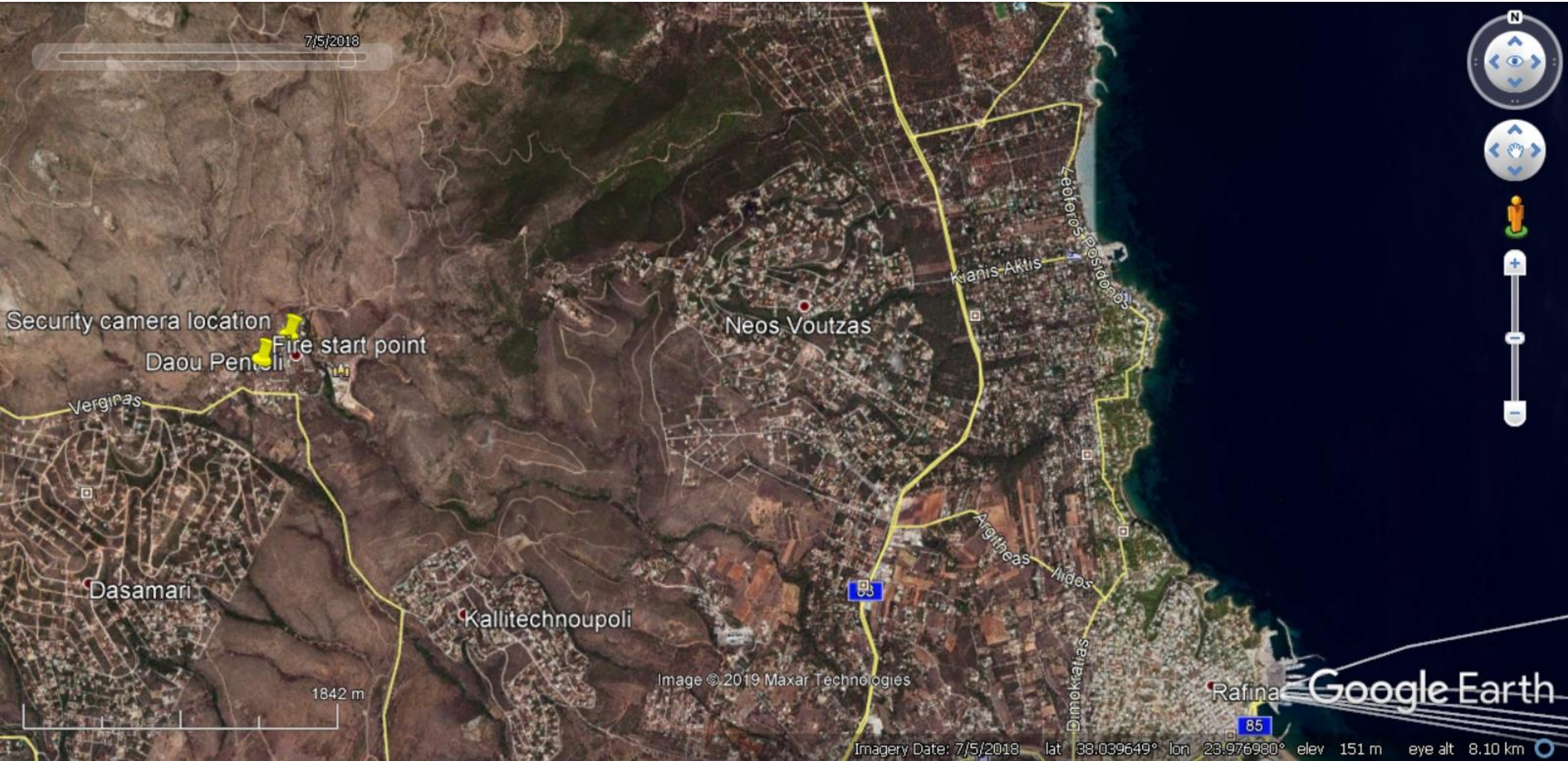


The smoke of the fire of Kineta as seen in the center of Athens at 13:08

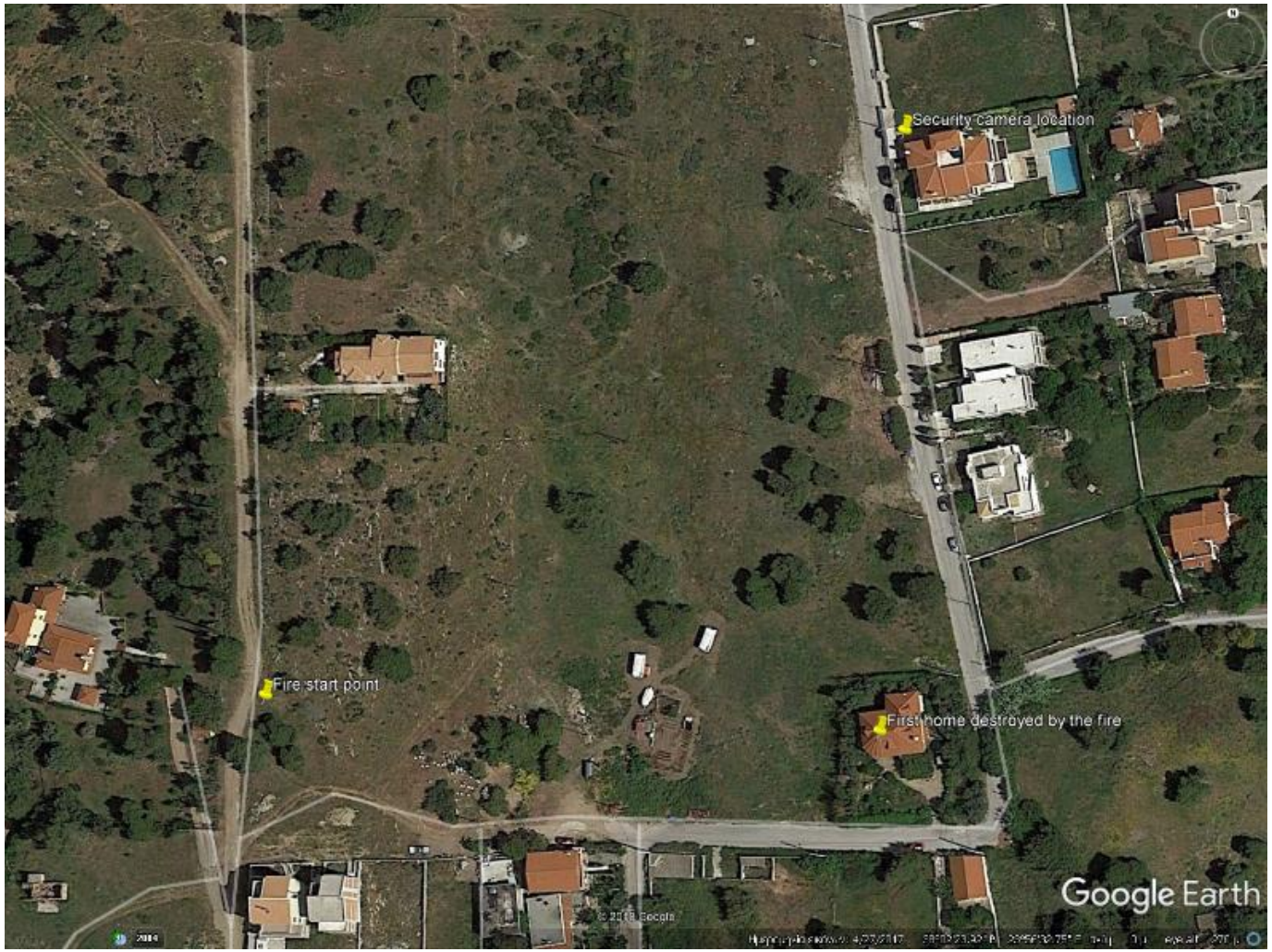
Fire weather and vegetation condition

- According to weather measurements at the National Observatory of Athens on Mt. Penteli, upwind of the fire, the prevailing wind was WNW with speeds ranging from 32 to 56 km/h for the first two hours after the fire start, with gusts of 50 to 89 km/h. Temperature didn't exceed 31°C and relative humidity varied between 34% and 43% RH making the probability of spotting relatively low.
- However, as the catabatic wind blew from Mt. Penteli towards the sea, through rough topography, meteorological conditions in the draws were affected by higher wind velocities, higher temperatures, and lower relative humidity. At the Hellenic National Meteorological Service station at Rafina, near the sea, temperature reached 38°C and RH dropped to 17% at 16:45. Wind gusts occasionally reached 120 km/h.
- Until that day, the season had been much wetter than usual and the vegetation was not water stressed (mid June condition).

The fire area on July 5, 2018



The start point of the East Attica fire



The start was within the perimeter of an August 2009 wildfire in the settlement of Daou Pentelis, 5.2 km west of the coast.

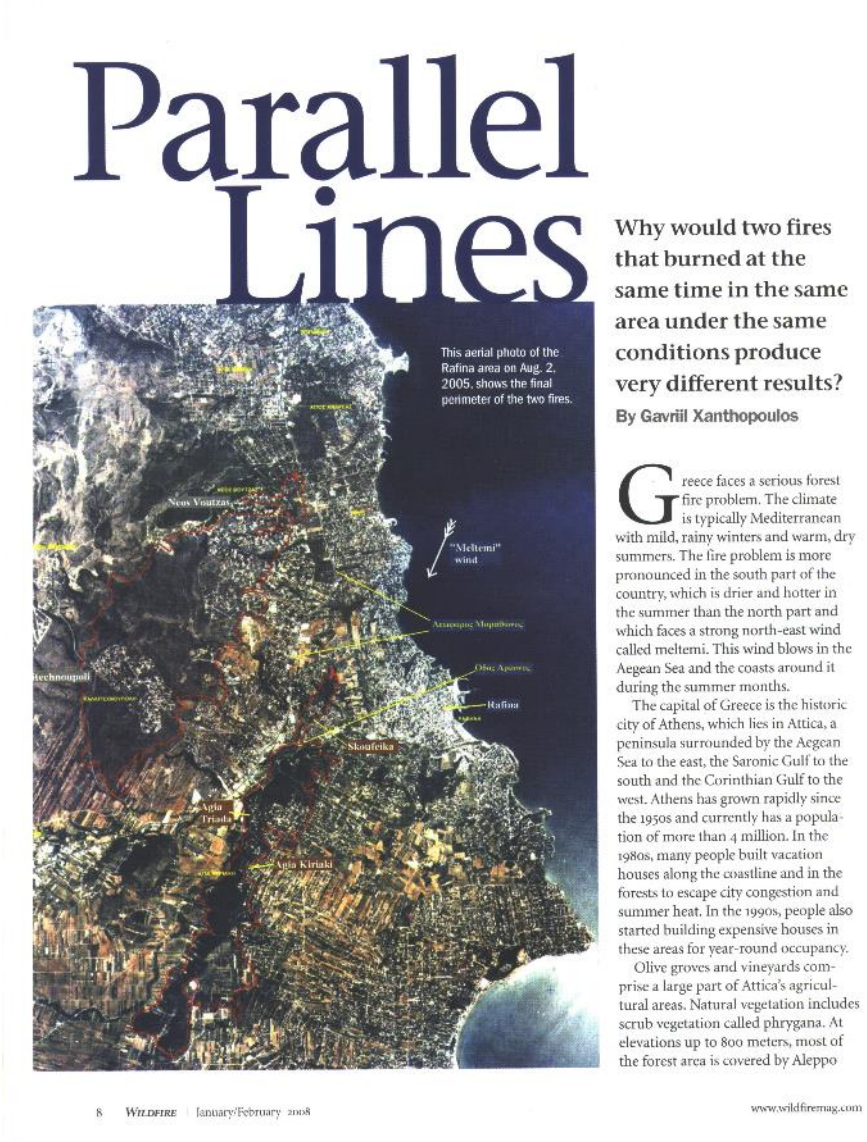
The first house that burned, 150 m from the ignition point

Fire start point

Initial spread of the fire at Mati

The combination of fast fire spread in a populated area, lack of a common overview of operations and poor coordination between the involved actors, combined with incorrect assessment and initial underestimation of the situation led to delayed and inadequate response – as many resources had been moved to the Kineta fire – and allowed the eastern Attica fire to grow rapidly.

Fire spread and the previously burned areas



Parallel Lines

This aerial photo of the Rafina area on Aug. 2, 2005, shows the final perimeter of the two fires.

Why would two fires that burned at the same time in the same area under the same conditions produce very different results?

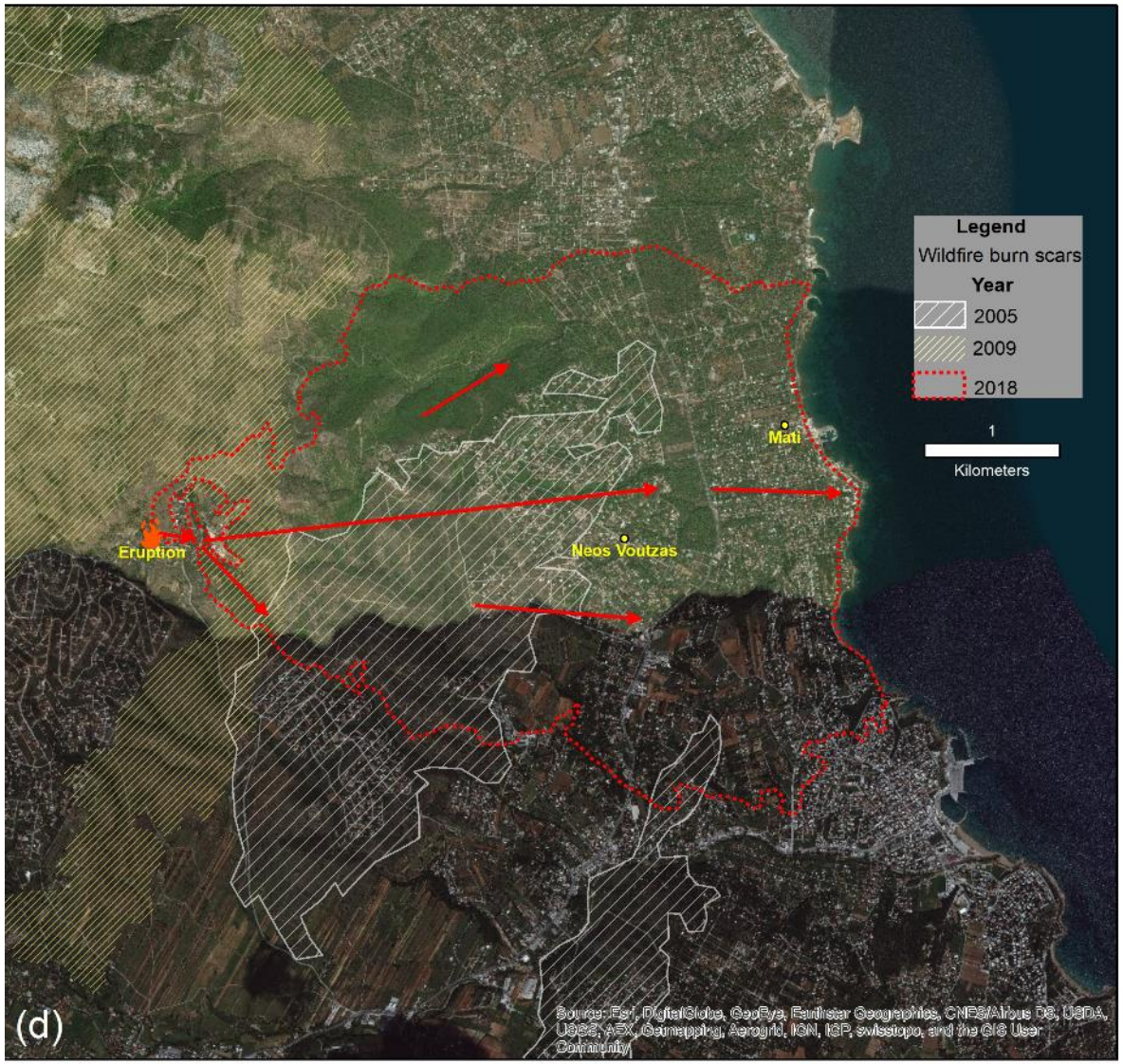
By Gavriil Xanthopoulos

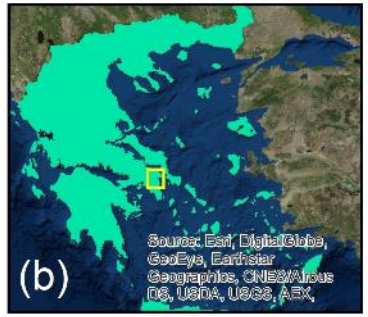
Greece faces a serious forest fire problem. The climate is typically Mediterranean with mild, rainy winters and warm, dry summers. The fire problem is more pronounced in the south part of the country, which is drier and hotter in the summer than the north part and which faces a strong north-east wind called meltemi. This wind blows in the Aegean Sea and the coasts around it during the summer months.

The capital of Greece is the historic city of Athens, which lies in Attica, a peninsula surrounded by the Aegean Sea to the east, the Saronic Gulf to the south and the Corinthian Gulf to the west. Athens has grown rapidly since the 1950s and currently has a population of more than 4 million. In the 1980s, many people built vacation houses along the coastline and in the forests to escape city congestion and summer heat. In the 1990s, people also started building expensive houses in these areas for year-round occupancy.

Olive groves and vineyards comprise a large part of Attica's agricultural areas. Natural vegetation includes scrub vegetation called phrygana. At elevations up to 800 meters, most of the forest area is covered by Aleppo

8 WILDFIRE | January/February 2008 www.wildfiremag.com





Source: Xanthopoulos (Wildfire 2008), Xanthopoulos & Athanasiou, (Wildfire 2019)

Fire spread

- Spreading through the wildland-urban interface (WUI) settlements east of the origin, first of Neos Voutzas and then of Mati, the fire reached the sea in a little less than two hours.
- Initially it burned in previously burned areas (2005, 2009), fast but with medium intensity. Then it entered previously unburned forest, especially north of Neos Voutzas.
- Its rate of spread, especially in the last stretch towards the coast, reached 4-5 km/h for short periods of time.
- In its path, it burned the mostly pine (*Pinus halepensis*) vegetation in small forest stands or in the yards of houses.

Reaching Marathon Avenue (around 18:18)

Marathon avenue before the fire

Burned area of the East Attica fire (23-7-2018)

Source: Hellenic Ministry of Environment and Energy

View of the general fire area with fire spread from left to right

Source: Xanthopoulos & Athanasiou, Wildfire (2019)

The East Attica fire in a nutshell

- 102 fatalities (more than 10 drowned!), at least 150 people seriously injured
- 1,431 ha burned
- Extreme wind, uncontrollable fire behavior
- Inadequate firefighting mechanism for the job, many errors in managing the event
- Unprepared communities and citizens

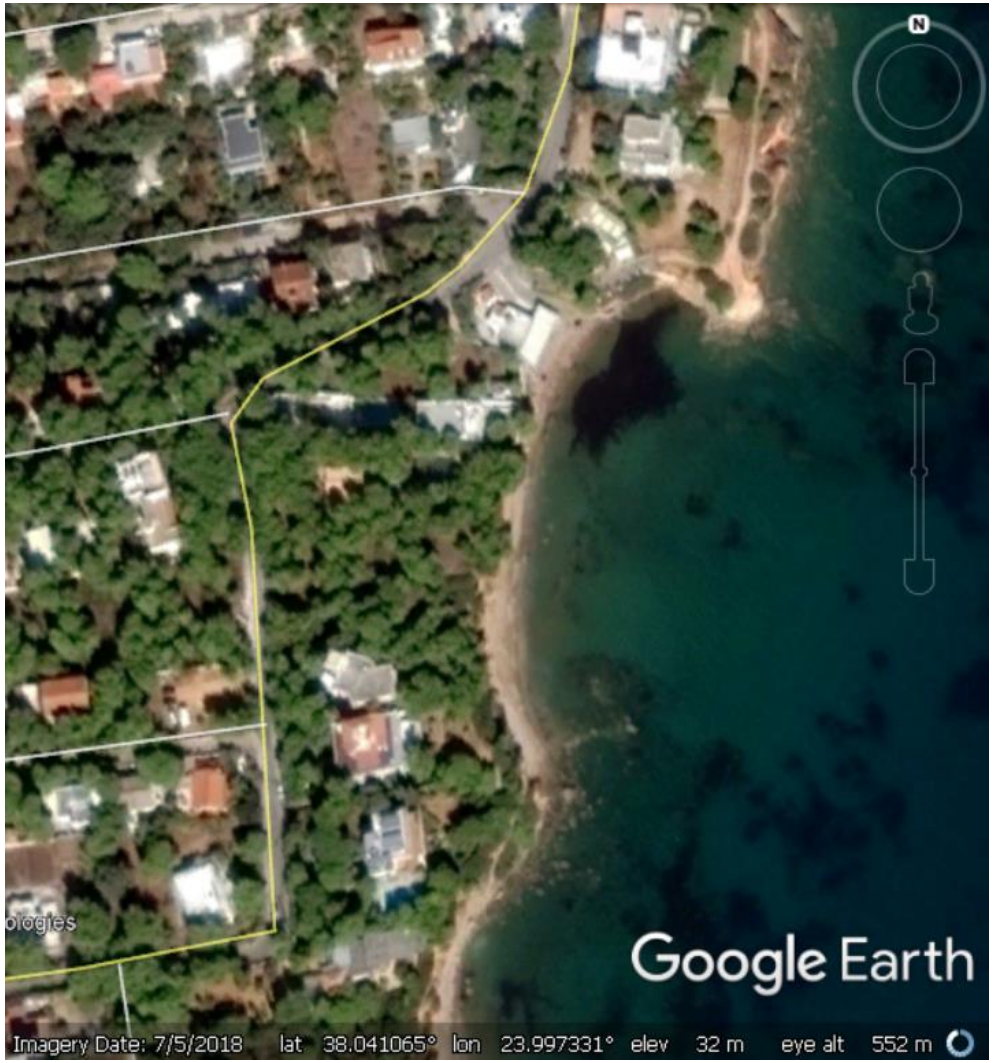
The conditions that led to fatalities

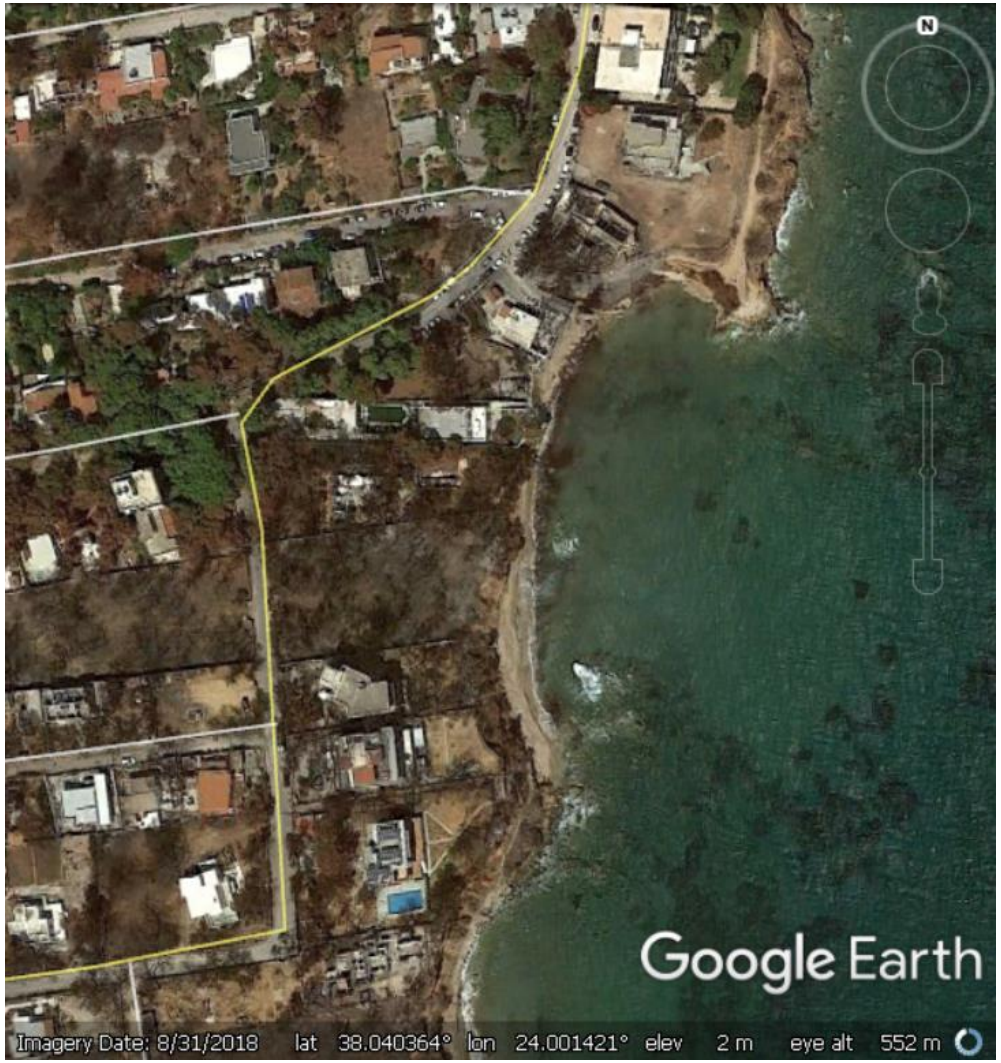
- In general people were either caught by surprise or made a delayed effort to evacuate. In general there were many errors of judgement.
- Among the victims many were trapped in a traffic jam that developed in the narrow streets while trying to escape with their cars, while several of them were trapped by the fire on a steep cliff above the sea as they were looking for a passage to the sea.
- In many cases people found themselves in hot gases pushed ahead of the fire by the gale force wind, and died due to inhalation or burns.
- Others who managed to get into the water, were exposed to heat and smoke for hours as rescue boats reached the site only hours later.
- Many of them lost their lives, either due to burns and inhalation of smoke and hot gasses, or because they drowned trying to swim away from the coast to escape the unbearable conditions.

No or difficult access to the sea

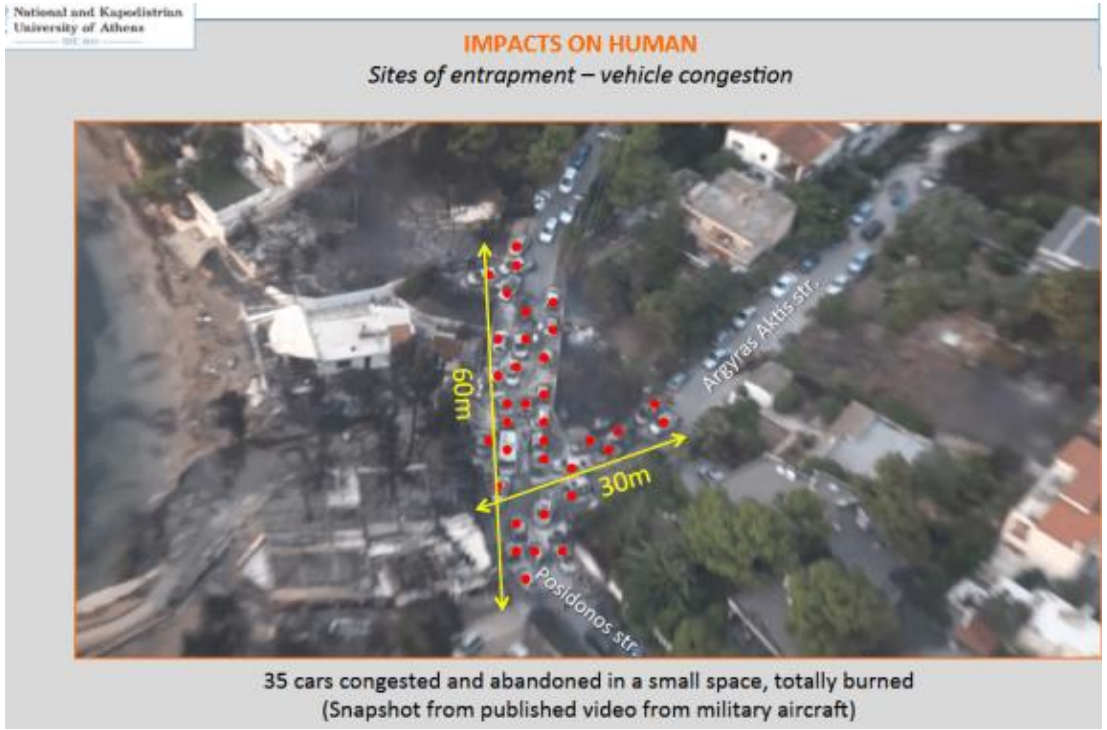
The site where 24 people were trapped over the cliff and the entrance to the lot

Seeking refuge in the sea – at the Silver Coast





Entrapment of cars and people due to a traffic jam at the “Silver Coast”



Left: A snapshot of the traffic jam at the “Silver Coast” taken from a published video from a military aircraft and used by the Department of Geology of the National and Kapodistrian University of Athens in an early study, a few days after the disaster.

Right: A traffic jam at this narrow point four days later, without the panic, flames, and smoke.

People in the water at the “Silver Coast” and search operations for bodies a few days later

Example of a well designed house that suffered no damages

A trailer home completely that was completely destroyed

Lessons learned

- Overwhelming importance of the extreme wind
- A multitude of factors affect the chance of a house to survive. The general rules hold, but there were many surprises (actions of owners and firefighters, coincidences, fire behavior fluctuation, etc.)
- Settlement layout contributed greatly to the disaster
- Unprepared public – Lack of knowledge resulted in fatal mistakes when seconds matter
- The authorities (Fire Service, Police, Port Police, Municipalities) made many serious mistakes during and immediately after the event, including slow response, lack of communication with each other, inadequate and inaccurate information to the public, denial of the size of the disaster for the first 24 hours…. All this backfired on them.

After the disaster

- The disaster, which is the second-deadliest wildfire event in the 21st century, after the 2009 Black Saturday landscape fires in Australia, brought the Greek society to a state of shock and it made the news around the world, with images of extreme horror and pain.
- The initial grief was followed by political finger-pointing and many efforts by experts and non-experts in forest fires to assess the reasons and the mistakes made, before and during the event that resulted in this unprecedented disaster.
- In March 2019, twenty officials, including the heads of the General Secretariat of Civil Protection (GSCP) and of the Region of Attica, two local mayors, high ranking officers of the Fire Service, and the Police, and the person who started the fire due to negligence, were charged with misdemeanor criminal offenses.

Appointment of an Independent Committee

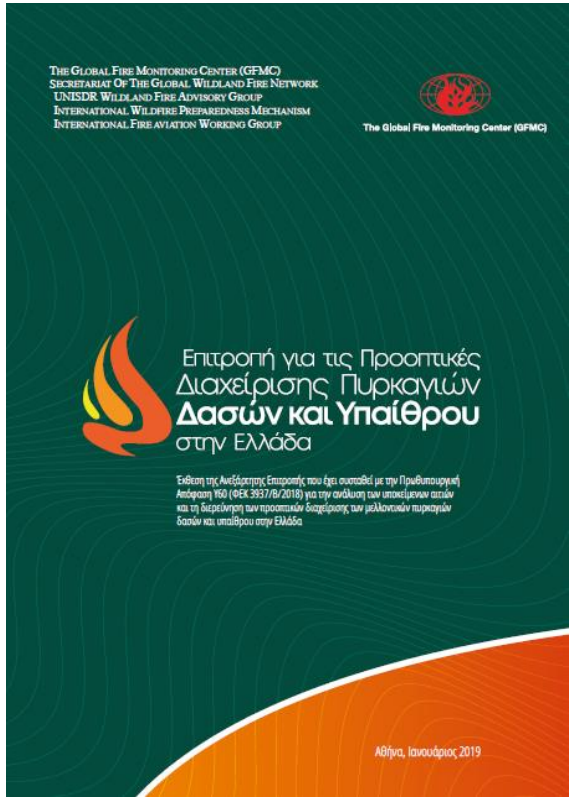
- As this was a huge catastrophe that followed the disastrous years of 1998, 2000 and 2007, with an increasing trend in damages and fatalities, the Prime Minister appointed an Independent Committee of wildfire experts, titled “Committee on Perspectives of Landscape Fire Management in Greece”, to shed light on the deeper causes of the worsening wildfire problem in the country and propose potential solutions
- The Committee consists of Prof. Johann Goldammer (Germany) as head, and five Greek forest fire experts: Dr. Gavriil Xanthopoulos, Prof. Alexandros Dimitrakopoulos, Georgios Eftychidis, Prof. Georgios Mallinis, Dr. Ioannis Mitsopoulos

The work of the Committee

- During its first five months of work the Committee collected and analyzed data, prepared and circulated questionnaires to 73 wildfire experts and professionals, met with 28 different agencies that are involved in some aspect of wildfire management.
- In December 2018 the Committee organized a round table to bring the main agencies together to talk to each other.

Presentation of the results

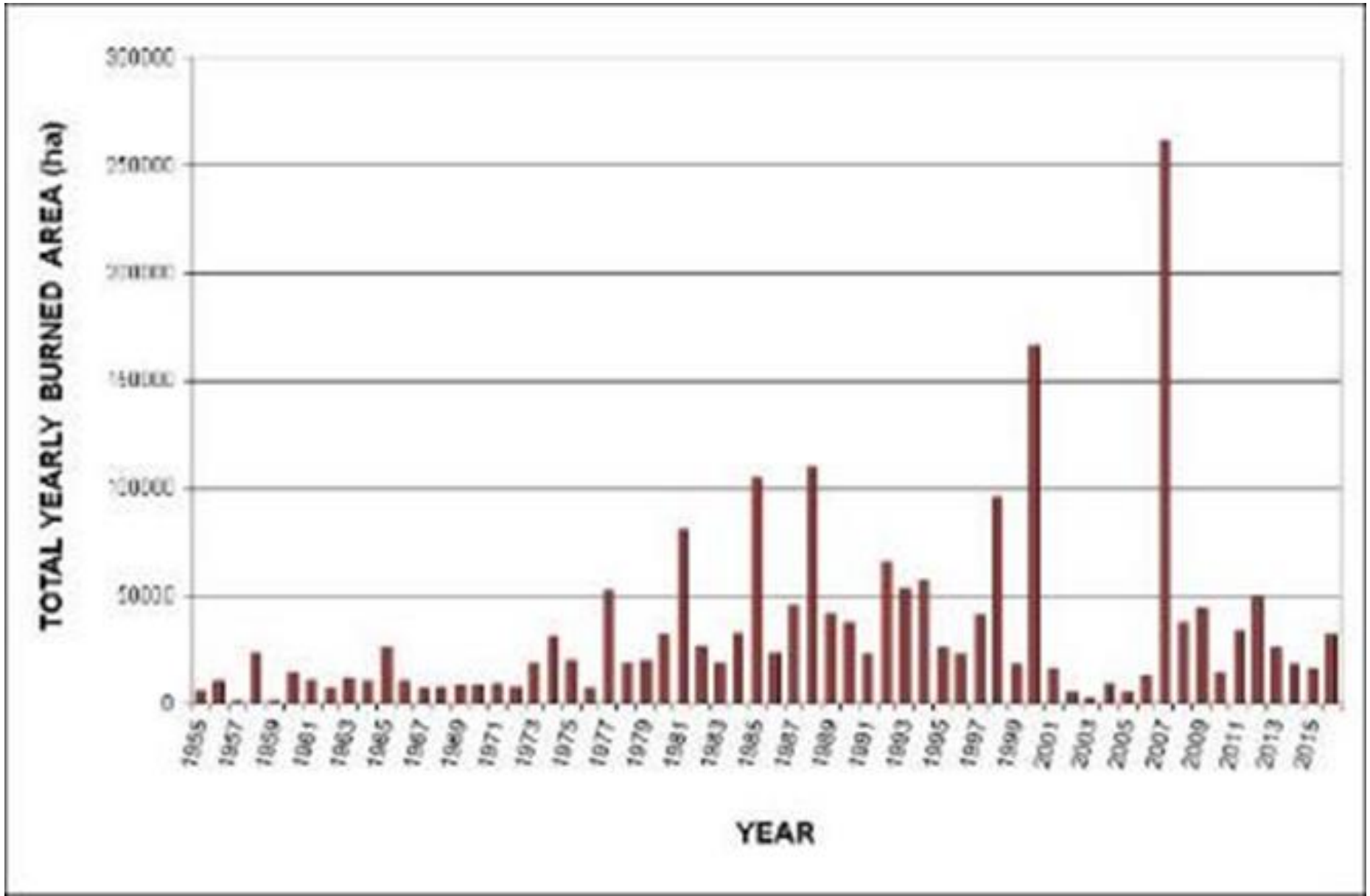
- The Committee completed its report in February 2019 and delivered it to the Prime Minister, the President of the Hellenic Republic, the President of the Parliament, to all political parties, and to the mass media.
- Immediately after that, the report (with English summary) was also made available online to the public at https://government.gov.gr/report-on-landscape-fires-in-greece/
- In the following two months the report was also presented to the Greek Parliament and to the European Commission.

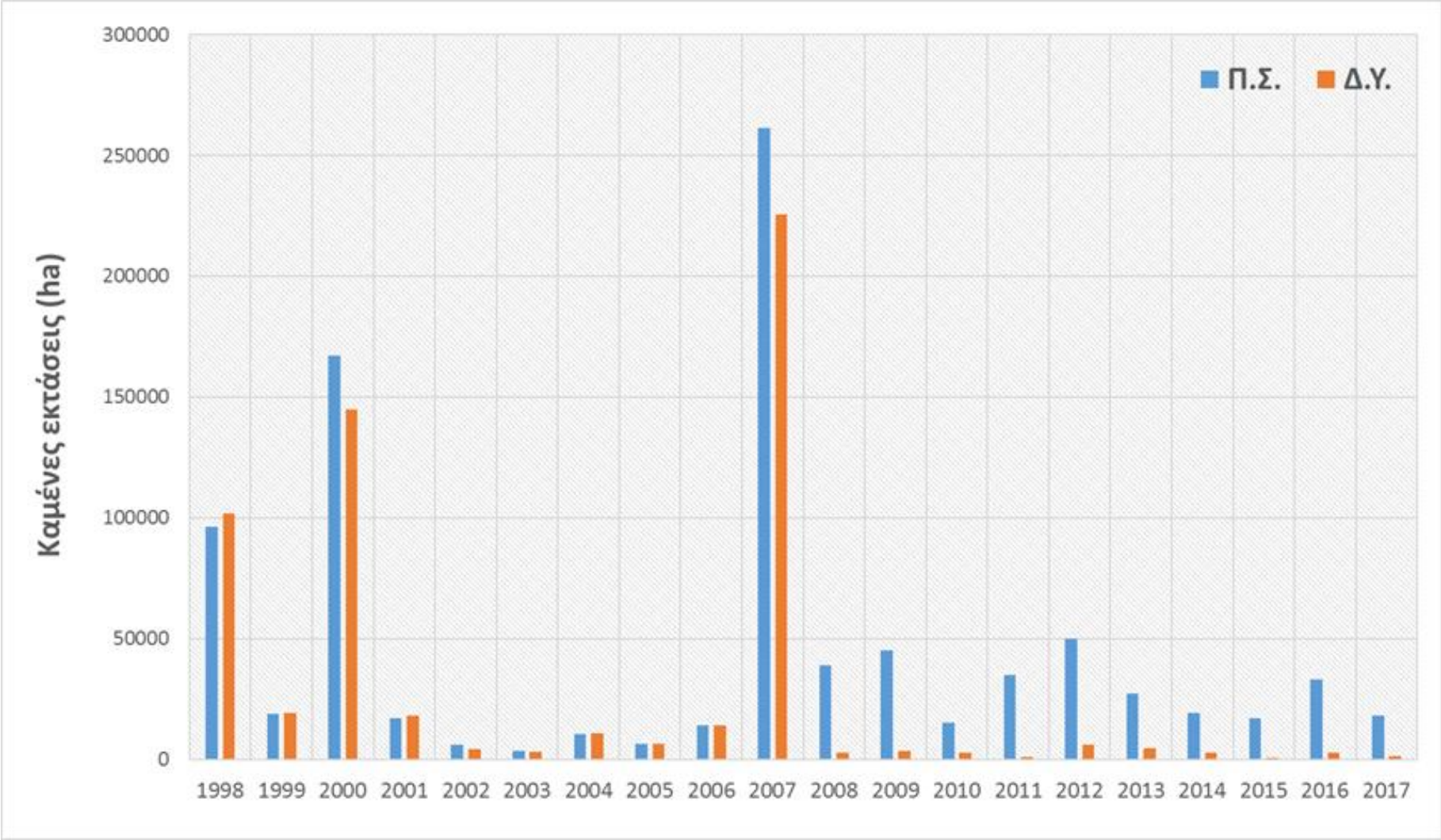


Main findings of the report (1)

- The first part of the report presented a description of the evolution of the forest fire problem in Greece and its current state.
- According to the data, the situation has been getting worse during the last decades with larger yearly burned areas, worse extreme fire seasons with increased damages and fatalities, and much higher costs.
- As regards the reasons for the deterioration of the situation, the accumulation and continuity of burnable vegetation (wildfire fuels) in forests and open landscapes, are identified as a major problem, resulting from abandonment of intensive land-use in the countryside and the lack of forest management due to limited availability of funds and institutional strength of the Forest Service.
- Along with this development there is an increasing risk of wildfires burning at the peri-urban areas, villages, farmsteads and tourism centers.

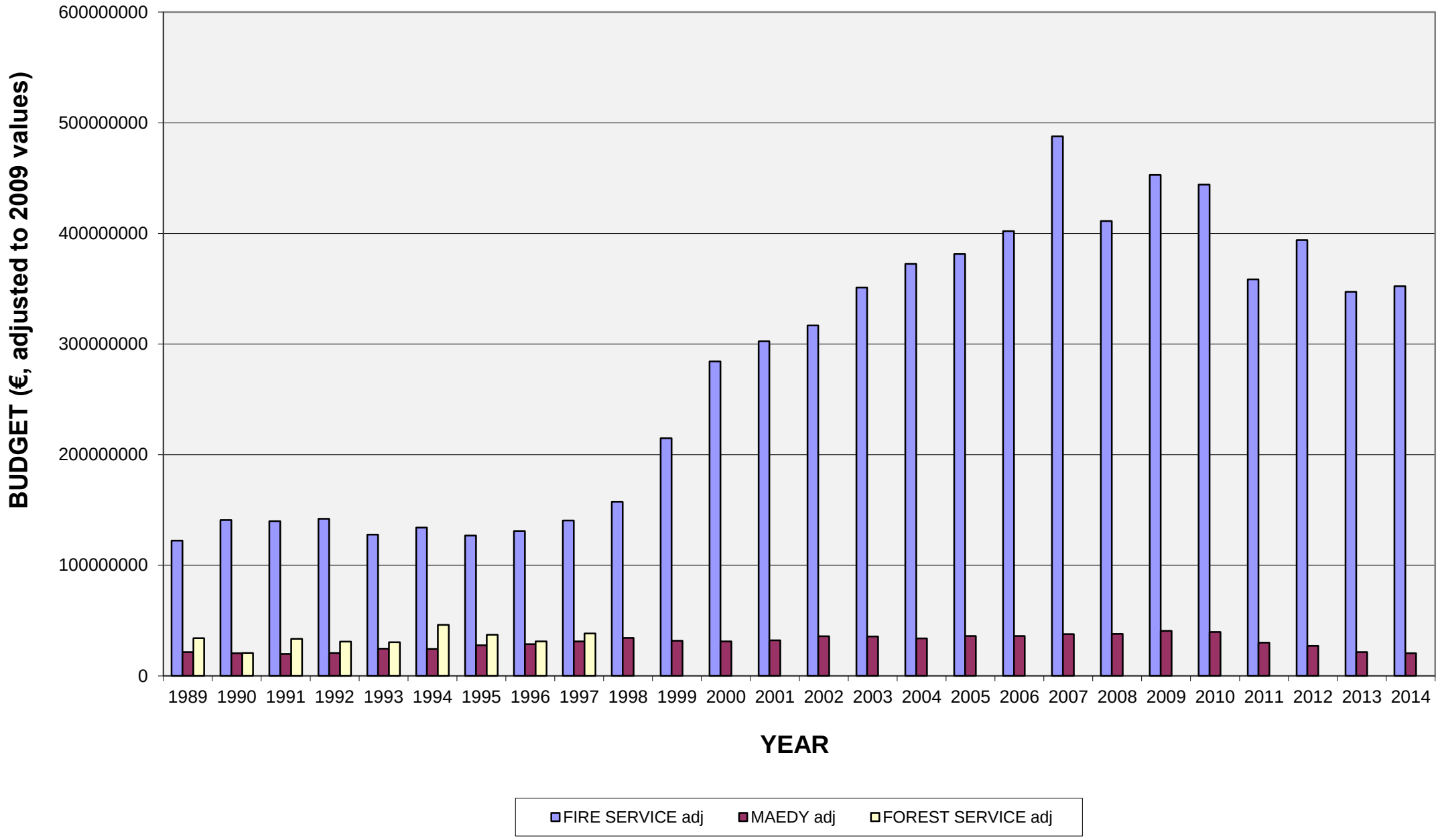
Burned area evolution in Greece

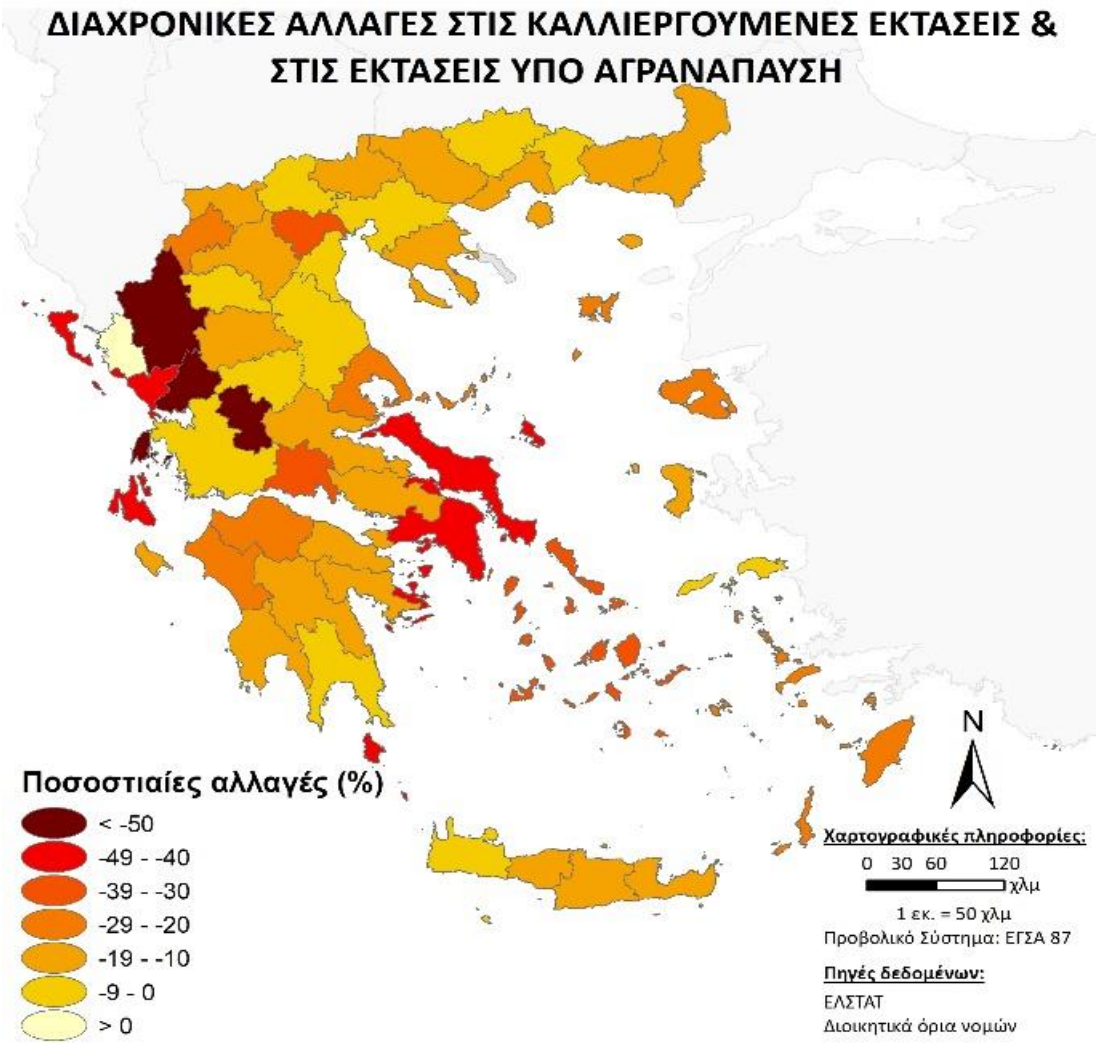


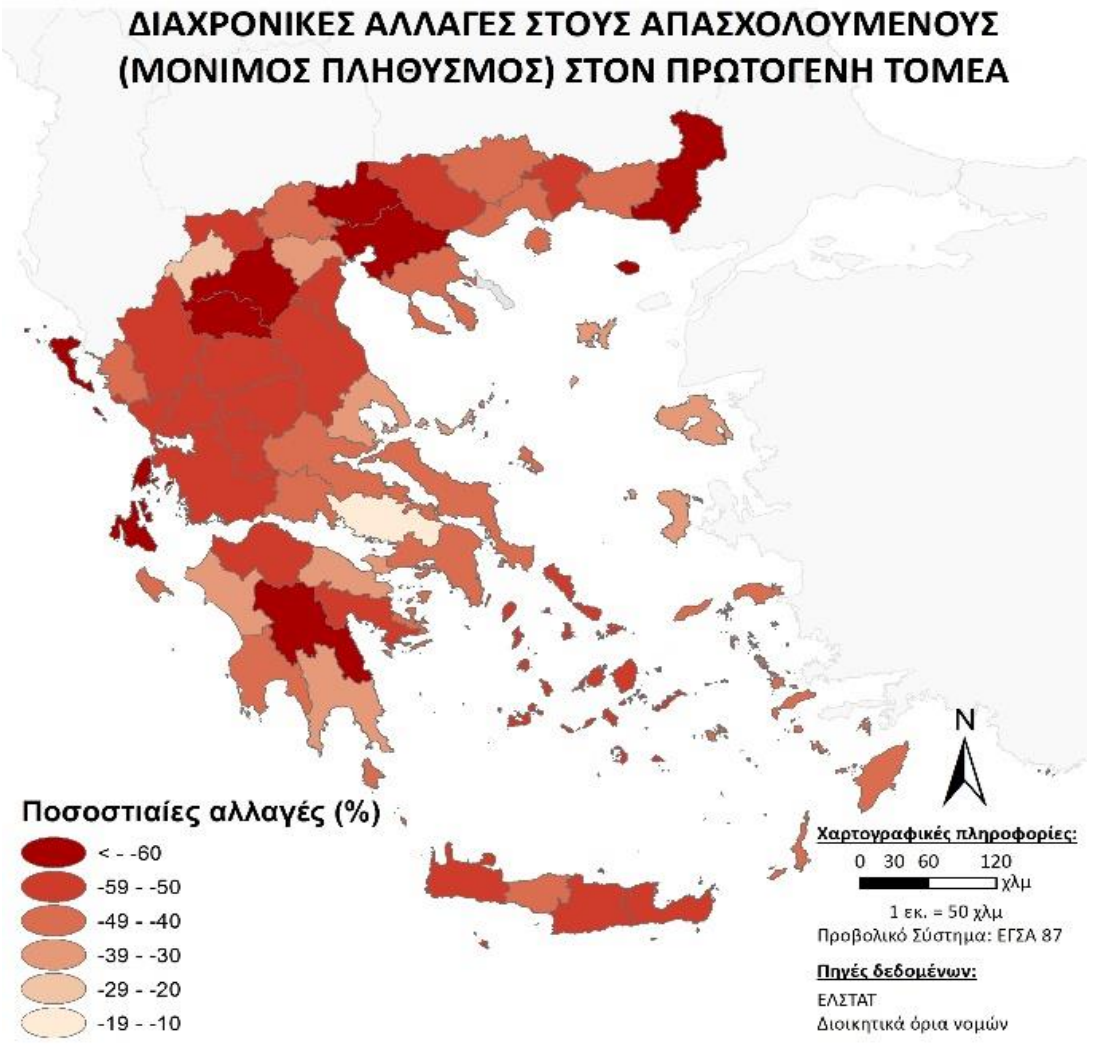


Differences in reporting of burned areas between
the Forest Service (orange) and the Fire Service (blue) in the 1998-2017 period,
highlighting the lack of cooperation between them
and the lack of reliable statistics

FIRE SUPPRESSION BUDGET EVOLUTION (1989-2014)

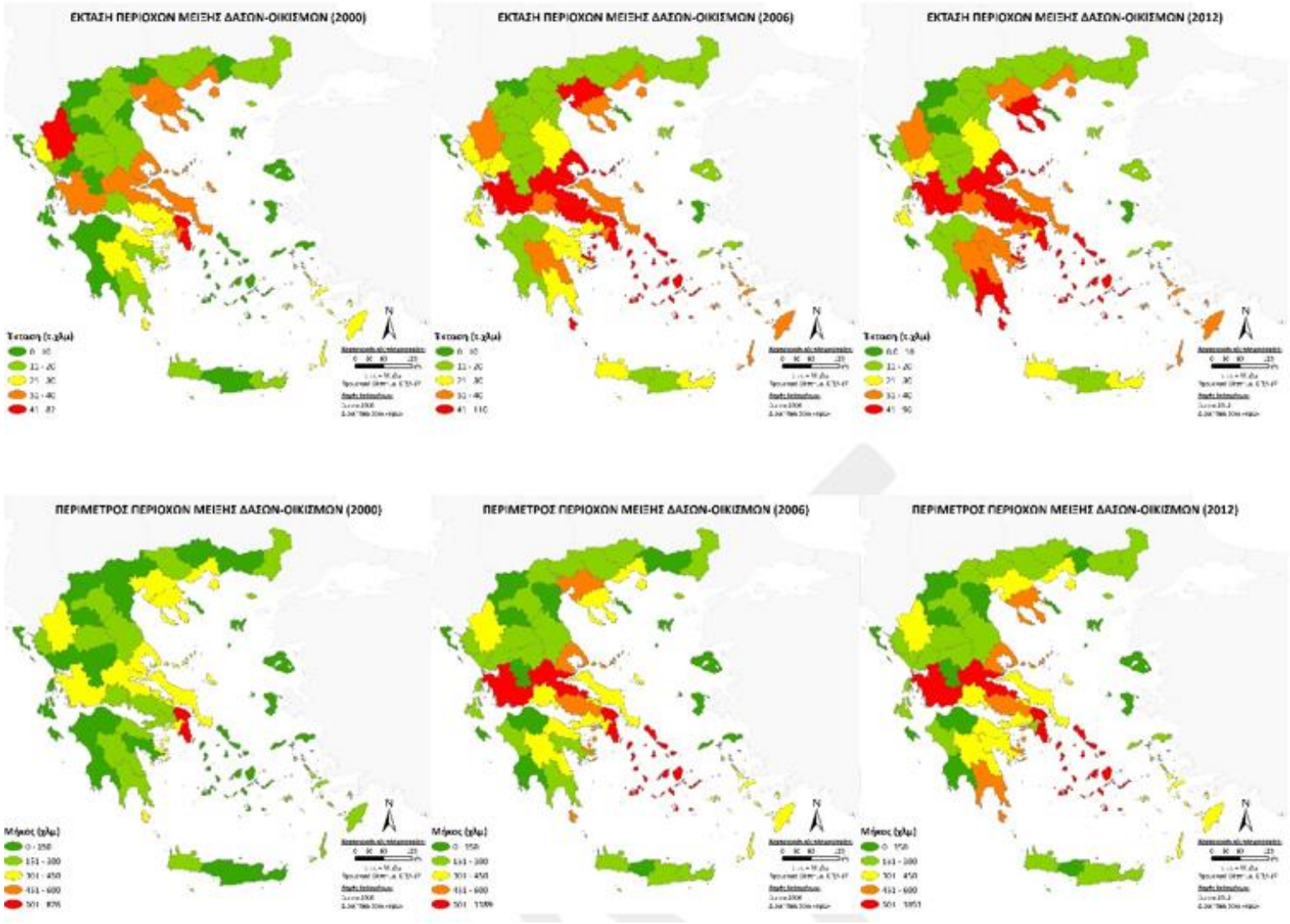




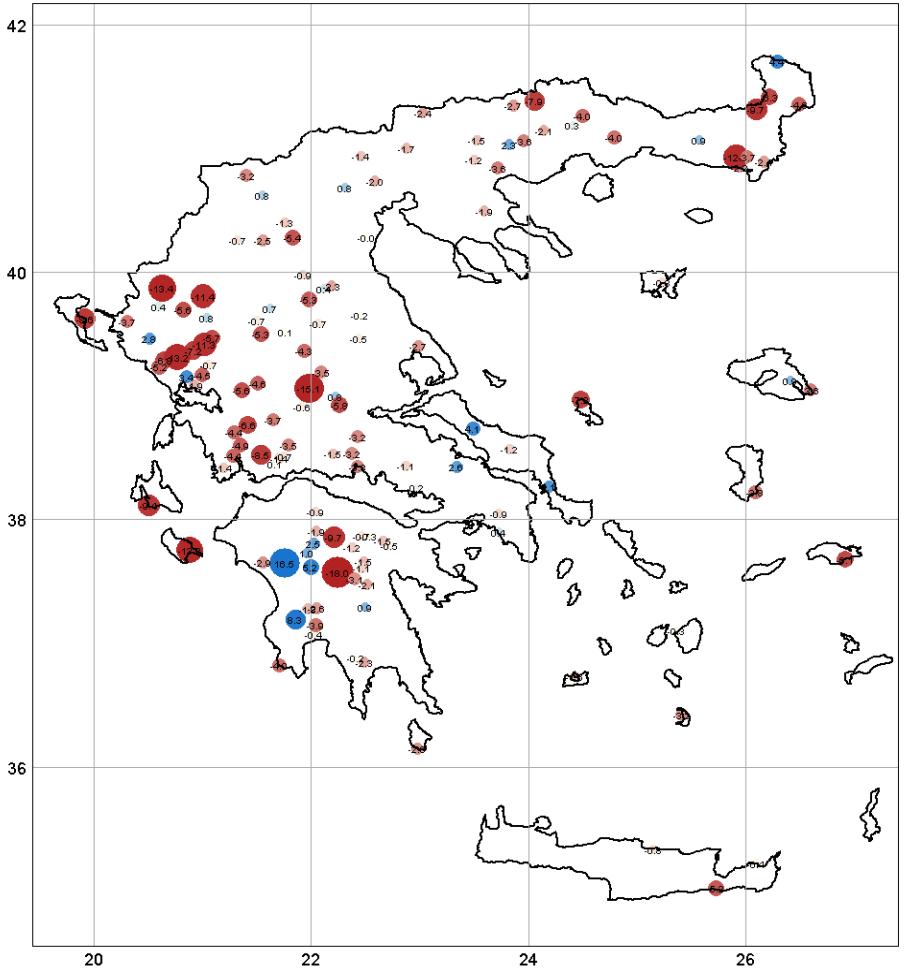


Changes in cultivated area (left) and employment in the primary sector (right) between 1955 and 2015

(Data source: Hellenic Statistical Service



Maps of the distribution of the area (km^2) (top) and perimeter (km) (bottom) of WUI areas, at prefecture level, based on the data of Corine Land Cover, for the 2000-2012 period.



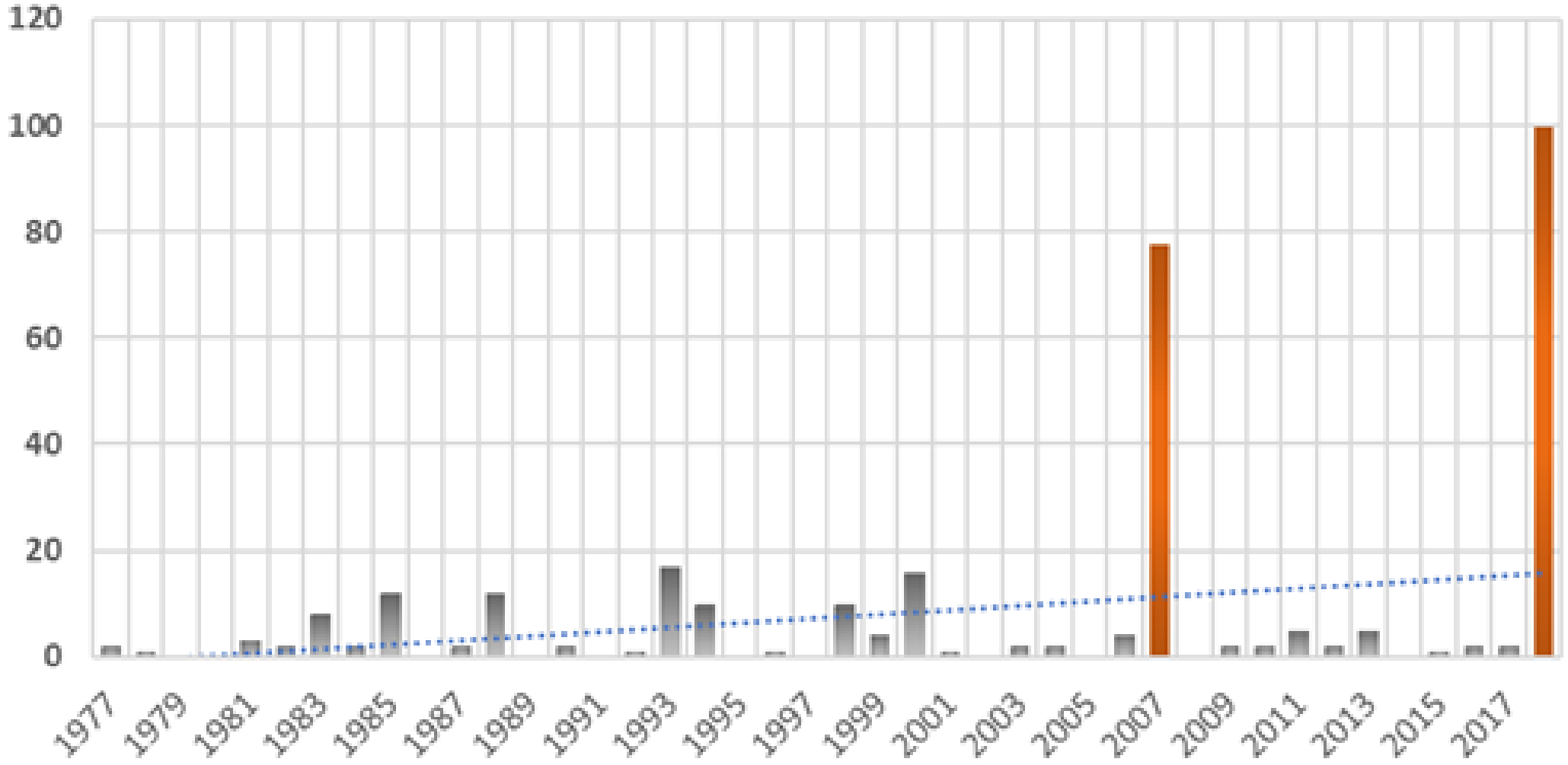
Trends in yearly rainfall (mm/year) by meteorological station in Greece for the 1940-2012 period: blue represents and increasing trend; red signifies the opposite.

(source: Markonis et al. 2016. Theor Appl Climatol. 130:217-232)

Main findings of the report (2)

- Fire prevention is very weak and ineffective. Identified prevention shortcomings under the current system include lack of common and coordinated approaches in fire prevention planning, absence of approved and documented local fire plans, unregulated and unplanned construction in forest areas and development of wildland-urban interface areas, very limited public information, awareness and mobilization campaigns, and ineffective organization of volunteerism.
- Wildfire statistics data, that could guide prevention actions, are of low reliability and present serious gaps, while adoption of modern technology and scientific methods to support planning and operations is at a poor level.
- There is a great discrepancy in the allocation of funds between fire prevention and suppression, in favor of the latter.

Evolution of forest fire fatalities in Greece in the 1977-2017 period



Main findings of the report (3)

- Despite increased funding over the last twenty years, the fire suppression capacities of the country have not increased proportionately in effectiveness and efficiency. The reasons for this are related to human and technical shortcomings (including disproportionately heavy reliance on aerial resources), and a serious deficit of cooperation and synergy among the involved agencies.
- Analysis of the legislation and of the available data, as well as of the opinions expressed by the experts and agencies who were interviewed, concur that currently the existing system is very complex and is characterized by lack of cooperation, coordination and operational readiness that are required to be prepared and to manage large-scale wildfire disasters.

Main findings of the report (4)

- For instance, for the prevention of wildfires a massive body of authorities belonging to many ministries are involved in Greece that would need to be coordinated in a common framework.
- While, according to the law, coordination of prevention should be implemented by the Forest Service, this is not feasible due to existing legal gaps.
- In wildfire suppression seventeen (17) authorities belonging to six (6) ministries must cooperate effectively, in order to execute eleven (11) different specific institutional responsibilities / tasks.

Recommendations (1)

- Based on these findings the Committee recommended that the problem of landscape fires should be tackled by the State using a holistic approach, through an integrated and coherent framework for landscape fire management.
- This system should replace individual and disconnected services and actions in prevention or suppression.
- An overall unified planning should address jointly wildfire prevention and suppression, as well as restoration of burned areas, in an integrated manner to ensure and strengthen societal, environmental and economic resilience.
- It is necessary to ensure the necessary legislative provisions, integrating them into operational planning within the framework of a unified, interagency national plan for the protection and safety from wildfires.

Recommendations (2)

- Addressing of all the above issues should be the subject of a scientific, advisory and coordinating organization for the systematic management of landscape fires at national level – tentatively designated as Landscape Fire Management Agency (in Greek – Οργανισμός Διαχείρισης ΠΥρκαγιών δασών και υπαίθρου – ΟΔΙΠΥ / ODIPY).
- This organization should operate in a co-operative manner with the other competent bodies having an advisory, coordinative and supervisory role in landscape fire management in the country with the mission to develop a national, interagency fire management plan and to monitor and follow up its application.
- Without such a mechanism, it will not be possible to achieve either a continuous and substantial effort to prevent fires, or the necessary spirit of cooperation between the actors involved.

Recommendations (3)

- ODIPY should have a leadership role in devising, guiding and supervising the collective measures in landscape fire management at national level. Its success will depend to a large extent not only on the correct choice of its management but also on the quality, capacity and competence of its staff.
- One of the main goals of ODIPY will be to function as an interconnection body of scientific knowledge, technology and operational practice (science-policy-practitioners interface). It should therefore ensure the co-operation of relevant bodies on all aspects of landscape fire management, with the establishment of permanent interdisciplinary and thematic committees.
- The committees will be comprised of well-known specialized scientists as well as executives-representatives of operational entities.

Recommendations (4)

- ODIPY will coordinate the development of a National Landscape Fire Management Plan, which will include a joint design of measures and actions for landscape fire management at all administrative levels, with the participation and cooperation of all stakeholders.
- A scientifically documented national wildfire risk assessment system, and a revision of the start and end of the fire season based on available statistical data and climate change assessments will support the Plan.
- At the strategic level ODIPY will work on balancing and rationalizing expenditures for landscape fire prevention and suppression.
- Maximization of effectiveness and efficiency will be at the center of its efforts.

Recommendations (5)

- For example, regarding firefighting, it will promote optimum use of the resources of all involved agencies through central planning, improved cooperation and coordination, creation of joint and certified training programmes for the staff of all stakeholders, and organization of joint interagency exercises at regional level.
- Emphasis will be put in the management of large fires by assigning highly trained and certified in wildfire behavior and incident management personnel (e.g., by following the example of the Incident Command System of the US NIMS), rather than using hierarchical criteria and ranks.

Recommendations (6)

- Regarding fire prevention ODIPY will organize methodically public awareness campaigns at all levels of society, and will promote voluntary participation of citizens in landscape fire management.
- Most important, it will organize the development, in cooperation with relevant stakeholders, of large scale map layers regarding the wildland-urban interface areas and the assets potentially at risk, such as critical infrastructures, cultural heritage sites etc.
- An even more important and challenging task of ODIPY will be to advise the development of policies regarding the management of rural land-use systems in terms of wildfire hazard reduction (fuel management), and the support and cooperation of the rural populations in managing fire risk including self-defense of rural assets against wildfires.

Recommendations (7)

- A key task of ODIPY will be the development, implementation and operation of a monitoring and data collection system that will include monitoring tools, such as a central daily readiness reporting system (fire season) of the actors involved in fire protection, and a recording and mapping system of funded prevention projects (e.g. where local authorities have applied fuel management projects).
- The focus will be to build an effective cost and activity accounting system that will allow to evaluate the system's effectiveness and efficiency, a necessary precondition for assessing trends, successes, shortcomings, and failures, in order to introduce changes where needed.

Recommendations (8)

- The Forest Service should be reorganized and empowered to participate actively in forest fire management. It has been weakened over the last two decades and requires adequate support to rebuild capabilities, resources and funding to restore its activities in forest management and fire prevention, and to get a role in fire suppression in the lands it manages. Without management of forest and rural landscapes, the problem of wildfires will increase independent of any efforts to strengthen the suppression mechanism.
- The Fire Service should continue to offer its services with regard to the suppression of landscape fires, being the main fire suppression authority in the country. However, its effectiveness and especially its efficiency must be improved by advancing its cooperation with the other actors under the guidance of ODIPY, improving the training of its staff and the volunteers, adopting innovative technical and tactical solutions, and most important decreasing the degree of dependence on the use of aerial firefighting resources.

Current status

- In the fire season of 2019 emphasis, as would be expected, was put once more on fire suppression, steeply increasing among others the aerial firefighting capacity with the corresponding costs. Clearly, it was necessary to avoid a repetition of last year’s nightmare at any cost.
- With the end of the 2019 fire season, the real test of the capacity to change in depth the fire management system into the proposed one, that can offer a scientifically based long-term solution, begins.
- A new government is challenged to address the issues that have been outlined in the report.

Prerequisites for success

- With careful planning and swift action it will be possible to achieve first results within the next 2-3 years, without compromising short-term results.
- However, there are certain prerequisites: that the lessons, which the disaster of 2018 taught us, have been learned; that the identification of the reasons for the long term worsening of the landscape fire problem identified in the Independent Committee report have been understood; and that the necessary political motivation for a truly sustainable solution exists.

Thank you for your attention