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# **ADVANCES IN FOREST FIRE RESEARCH**

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## Local response to extreme wildfire events in populated areas: practices and lessons learned from the Mati/Attica (2018) and North Evia (2021) fires, Greece

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### Abstract

Managing extreme wildfires requires a more holistic approach where proactive governance, citizens, and local communities play a central role.

Two recent devastating wildfires in Greece, the one in July 2018 in Mati/Attica and the other in August 2021 in North Euboea, demonstrated to a large extent the weaknesses and gaps in the Civil Protection mechanism as well as the inadequate preparedness of the local population to deal with such fires. In addition, both fires had a high societal and political impact and raised a lot of criticism and opposition.

Both fires burned under extreme weather conditions (i.e., extreme winds in Mati and prolonged heatwave in Euboea) and in parallel with other major fires in the country. However, they were characterized by quite different fire regimes, ecosystem and landscape features, and the local community type they affected.

This paper studies and analyses the combined response of the civil protection authorities and the local communities during these significant fire events.

Focused surveys, questionnaires, interviews, onsite discussions, and round tables with local authorities, citizens, first responders, and representatives of the touched communities were organized to collect information on problems, challenges, and risks, as well as response practices that proved to be effective during the response phase.

This work aims to identify lessons learned for suggesting a revision of current practices and policies to bridge the gap among the actors involved in wildfire management and to facilitate the development of local adaptation plans to increase the resilience of the local communities to wildfire risk.

### 1. Introduction

The new context of extreme wildfires requires implementing a more holistic fire management approach. Environmental management, climate adaptation, safety concerns, and cultural and socio-economic opportunities need to be coupled with proactive governance to mitigate disastrous situations in the near future. Furthermore, revision of forest management practices and large-scale and community-based actions are necessary for reducing the risk, increasing awareness, and improving preparedness. In this puzzle, citizens, local communities, the forestry, and bio-economy sectors have to play a significant role. (Cordis-European Commission, 2021)

Furthermore, the intermix of settlements with natural ecosystems and the fires occurring between wildlands and rural and peri-urban settlements cause severe wildfire challenges that often become the subject of intense political debate and confrontation.

Wildfires that break out the recent years under severe weather conditions, exacerbated by the ongoing climate change, can rapidly grow across the intermingled structures and vegetation, and firefighters can hardly control their propagation. Such fires can potentially burn large wooded and rural areas and destroy houses, properties, infrastructures, and livestock, while they may also result in severe injuries or even fatalities.

Recent major wildfire disasters in Greece and other EU countries have proved that the government organizations, the public authorities, and the citizens are not sufficiently prepared to handle the worsening of fire regimes. Therefore, the communities need to adapt landscape management to prevent and reduce the risk of wildfires, defend the rural communities and the natural resources, and protect human lives against the adverse direct and indirect impacts and consequences of wildfires. (Goldammer et al., 2013, Dimitrakopoulos, 2019)

Becoming a fire-resilient community that can cope with the wildfire challenges is linked to a continuous, iterative process of adaptation to the landscape and the socioeconomic factors in these areas. Unfortunately, the way the threatened communities may pursue adaptation remains entirely unclear. There is also inconsistency in how citizens perceive risk and how the civil protection authorities do so. This fact contributes to a risk perception-action gap (Wachinger et al., 2012; Margolis, 1996) that often sub-optimizes both efforts.

Fire disasters offer lessons on organizational weaknesses and allow to identify good and bad practices. Moreover, there is a specific “window of opportunity” following the disastrous event to integrate the outcome of such lessons into local government policy changes. (Mockrin, 2018)

This paper studies and analyzes the combined response of the civil protection authorities and the local communities during two recent major wildfires in Greece. The purpose is to identify lessons learned to suggest a revision of current practices and policies and bridge the gap among the efforts of the actors involved in wildfire events. In addition, organizational and societal adaptation to the risk of large wildfires must be considered to increase the local communities' resilience and protect the natural ecosystems in fire-prone areas.

Focused surveys, questionnaires, interviews, and round tables with local people, first responders, and representatives of the touched communities were organized to collect information on identified problems and practices that proved effective during the response phase. The aim is to use this material to develop a proper local adaptation plan to increase the resilience of the local communities to wildfire risk.

### **1.1. Fire events**

The fires under consideration are characterized as “extreme events” and had a very high impact on society and at a political level. However, they had pretty different features regarding the fire regime, the ecosystem environment, landscape patterns, and the local communities' attributes that they affected.

Both occurred in parallel with other important fires in the country, which had started earlier and occupied most suppression forces; the authorities initially underestimated or overlooked their severity. Thus, the initial attack effort was inadequate.

#### ***1.1.1. Mati fire – July 2018***

On the 23rd of July 2018, at 16.30', a fire ignited north of Athens in the settlement of Daou-Penteli, which belongs to the municipality of Penteli. Due to very strong and gusting winds in the area, blowing from an unusual direction, the fire spread quickly as a crown fire and headed east towards the sea. It propagated across the wildland-urban interface causing significant damages and losses in the settlements Neos Voutzas, Mati, and Kokkino Limanaki, which are sited north of Rafina port.

Due to the extremely fast fire spread in a built forested area with thousands of houses mixed with forest vegetation and narrow streets, several people were blocked in their homes or trapped in their cars trying to flee from the area. In addition, several people were caught by the fire as they attempted to reach the sea to be safe. In a fire that lasted less than six hours, hundred two (102) people lost their lives, several were injured or inhaled toxic smoke, while many houses suffered partial damage or total collapse. The fire propagation stopped when it reached the sea after a few hours and burned only 1400 ha.

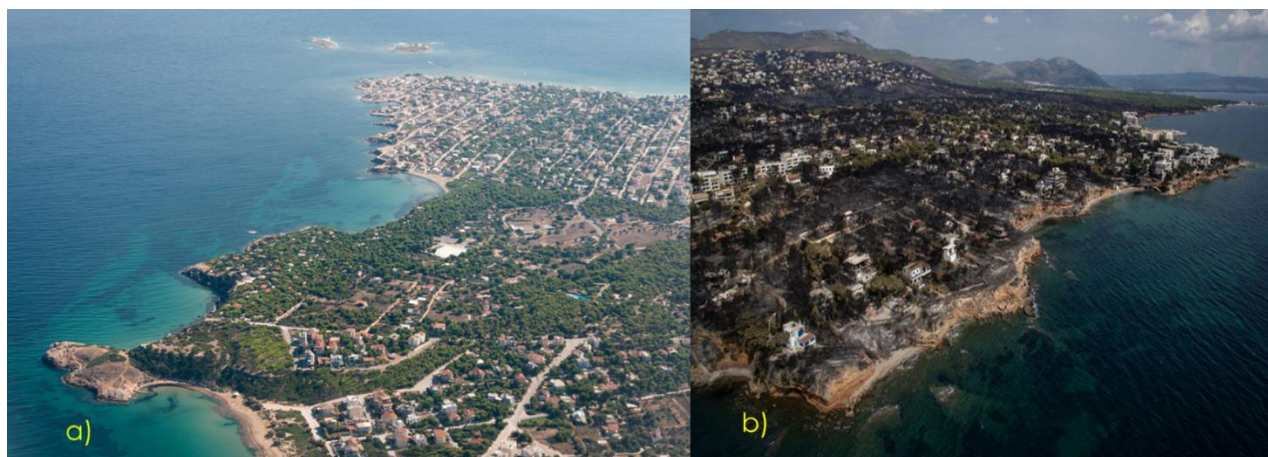


Figure 1. View of Mati area a) before<sup>7</sup> the fire and b) after<sup>8</sup> the fire

### 1.1.2.N. Euboea fire – August 2021

The fire ignited on 03/08/2021 at 15:30 and was finally contained and secured on the 17th of August. The total burned area was 51245 ha and affected two municipalities of the Northern part of the Euboea island, namely Istiaia-Aidipsos & Mantoudi-Limni-Agia Anna.



Figure 2. Burned area of N.Euboea mega-fire (2021)



Figure 3. Burned area of Mati-Neos Voutzas fire (2018)

The fire weather conditions were characterized by the extreme heatwave affecting Greece, Turkey, and the southern Balkan peninsula, lasting from the last days of July until the first ten days of August. The heatwave was the most intense of the past 30 years. It was a high-intensity surface & crown fire, especially in places of dense pine stands, with a low rate of spread due to low wind speed during combustion, in combination with a considerable accumulation of fuel, due to inadequate forest management for fire prevention through fuel treatment actions.

<sup>7</sup> [https://upload.wikimedia.org/wikipedia/commons/4/40/2014-10-22\\_11-32-46\\_Greece\\_Attika\\_-\\_Raf%C3%ADna.jpg](https://upload.wikimedia.org/wikipedia/commons/4/40/2014-10-22_11-32-46_Greece_Attika_-_Raf%C3%ADna.jpg)  
<sup>8</sup> <https://www.bbc.com/news/world-europe-44968581>



*Figure 4. The fire threatened the town of Limni in N.Euboea<sup>9</sup>*



*Figure 5. Several losses in Mati were due to the trap of cars in the narrow streets of the settlement*

## **2. Methodology**

To identify diverse approaches and understand the role, the practices, and the interaction among local actors during the fires, targeted surveys/interviews and dialogue meetings were applied with Local Civil Protection Authorities, first responders, and representatives of local communities.

Two workshops were also organized in the areas of interest, with thirty-two (32) and forty-six (46) participants, in Mati/Attika and North Euboea, respectively, in which round-table discussions took place and provided a lot of information input for the local response, community and volunteers involvement, the impact of the fire and the activities after the fire events. The topics discussed during the interviews and dialogue meetings and the round table discussions during the workshops concerned:

- a) general aspects of the operation of local civil protection authorities and community groups, such as existing resources and operational framework and knowledge and training background, perception of resilience
- b) Relationship and interaction with other authorities, community groups, and also citizens during a forest fire emergency
- c) Response actions during the specific fire events
- d) Evaluation of actions and suggestions for improvement after the fire

The information extracted was analyzed, and shared elements were grouped to identify common aspects of local fire management and response during fire events, and to understand problems, discrepancies, strengths, and potential for development through lessons learned.

## **3. Results & Discussion**

According to the results of this study, regional and predominantly local authorities are in direct communication with various community groups, organized volunteers, and active citizens who are active in their area. Typically, there is good collaboration with these groups, and they perform jointly several actions related to the fire management phases, including the response.

As many interviewees stated, the authorities tend to be more rational and objective in their perception of risk and try to be guided by circumstances and statistics. In contrast, the population tends to react more emotionally. (Varela et al.,2022)

The authorities highlighted the opinion that citizens do not understand the risks they face and that they need to become more self-reliant.

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<sup>9</sup> <https://www.ekathimerini.com/news/1165654/six-villages-evacuated-in-evia-as-fire-burns-through-forest/>

However, it is expected that local voluntary groups often specialize in forest fires in their area, especially in the rural and forested areas, and have a good perception of the fire risk. Therefore, voluntary groups, which were self-organized, played an essential role during the mega-fire in Euboea.

Technological systems (the 112-emergency line) and social media communicate the fire emergency with the community. However, the challenge is to disseminate information to vulnerable groups, the elderly and children, who do not have access to the Internet. The civil protection plans provide specific provisions and practices for vulnerable groups of citizens.

Despite the overall cooperation, a problem commonly mentioned is the lack of an interoperable Operational Centre. All the local, regional and national authorities can use such an organizational structure to have a complete operational picture of the event, facilitate the coordination suppression effort, and provide specific instructions to the volunteer firefighters and the citizens.

It is worth mentioning that according to most local authorities, a fire disaster provides opportunities for improvement. Nevertheless, many interviewees commented on the weaknesses of their organization due to limited resources or coordination problems and the insufficient actions for risk management and communication. However, after evaluating and criticizing the management's actions during the fire events, they provided ideas and suggestions for the future. For example, in the region of Mati, after the fire in July 2018, gathering places were created, signs marking routes to the sea were erected, and special spatial plans (SPPs) began to be drafted.

Some of the actions at a national and local level after the catastrophic fire in Mati/Attica are the following:

- 112 Emergency Service was activated
- the responsibility of evacuation was transferred from the first and second levels of local government to the central authority in the Ministry of Climate Crisis and Civil Protection.
- local government officials are trained in Civil Protection by institutions such as the Centre for Training and Lifelong Learning and the National University of Athens.
- Independent Civil Protection Offices have been established both at the first & second level of local government and at the Central Authority
- Updated natural disaster plans were created.
- The Municipality is funded by the relevant Ministry of Climate Change and Planning in addition to the low funding it received until recently from the Central Government
- G-Polis web application was organized as a means tool to inform the residents of the Municipality directly on their mobile phones about any dangerous - alarming event that takes place and "guide" the residents for its evolution.

Nevertheless, the excessive use of evacuation orders and the misleading instructions during the fire in North Evia led to non-compliance with state recommendations and relative loss of trust. This fact was confirmed by the majority of local authorities and residents interviewed, demonstrating the need to reorganize and update the plans and procedures and the doctrine for evacuating areas during wildfires, considering the fire situation, landscape conditions, and the capabilities of the local population. The possibility of partial evacuation should be given case-by-case (evacuation of children, elderly and vulnerable groups to a safe place). This approach will allow the competent/healthy people from the area to support the response mechanism since the local population knows the site better than the firefighters, who are often sent as reinforcements from services that arrive from distant municipalities or regions. The above presupposes that the volunteers know how to protect themselves, i.e., that they have received training, are adequately equipped, and are collaborating with the firefighters in an organized manner.

The study of local response to extreme fire events that occurred in two geographic areas that significantly differ in landscape and socioeconomic aspects allows the broader analysis of the applied practices at the local level. It can also be used to understand the deficiencies and weaknesses of the response actions comprehensively. There are a need to integrate, monitor, and coordinate fire management activities from the local to the central level in the context of the civil protection organization. However, to improve the effectiveness and efficiency

of protection, it seems necessary to strengthen the involvement and preparedness of the local actors during significant wildfire events.

Properly designed adaptation plans aiming to increase the resilience of the local communities to wildfire risk can benefit from the results and the analysis envisaged in this paper.

#### **4. Acknowledgment**

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Photo by The Times – Infographic shows the situation