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Research Article

EVALUATION OF GUZELYALI SETTLEMENT IN TERMS OF FIRE RESISTANCE

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ABSTRACT. Turkey faces fire risks in the summer months due to its location in the Mediterranean climate zone. In recent years, climate change and drought have increased this risk. In terms of climate, the fact that the number of windy days in the summer in Çanakkale Province is high and that wind speeds sometimes rise significantly can cause fires to spread very quickly and even become uncontrollable. In August 2025, fires that broke out in many different areas of Çanakkale were controlled only after a long time due to the effect of the wind, causing damage over vast areas. While these fires severely harm the region's ecological system and wildlife, they also destroy residential areas, infrastructure, and the socio-economic life of the region. In the fire that occurred in August 2025 in Çanakkale, many homes and vehicles in Güzelyalı village, connected to the central district, became unusable. Since the area is used as a summer resort, this was the period when the population was at its peak, and there was widespread panic. This study was conducted based on this problem. The study identified through literature reviews what should be considered in the planning of residential areas, especially the parts that are closely integrated with forests. By examining the climate characteristics of Çanakkale, the study aimed to analyze the use of fire-resistant plants in the landscaping around the Güzelyalı residential area. As a result, necessary measures to prevent the recurrence of the same problem in the future were discussed.

Keywords: *Çanakkale, natural vegetation, forest fire, landscape architecture*

INTRODUCTION

In recent years, climate change-related factors such as rising temperatures, irregular rainfall patterns, and drought have significantly increased the frequency of forest fires and the size of the areas affected. Due to its location in the Mediterranean climate zone, Turkey faces high fire risks during the summer months; these fires seriously affect not only the ecological system but also residential areas, infrastructure, and socio-economic balances. The causes of forest fires in Turkey have varied over time and with changes in societal lifestyles, and in recent years, most fires have been determined to be caused by

negligence, carelessness, intentional acts, lightning, and unidentified factors [1]. To accurately understand the severity of the fires and to develop effective solutions, the extent of the damage occurring in the landscape ecology must be identified as soon as possible [2]. To repair this damage, areas in the natural landscape structure that require restoration should be rehabilitated to make them habitable and usable again.

When it is not possible to restore the damaged landscape areas, reconstruction and improvement works close to the conditions before deterioration or intervention are called rehabilitation [3]. Rehabilitation works are in question in all areas of the ecosystem. Landscape restoration works should be carried out as part of the landscape planning process in damaged and deteriorated areas after forest fires. As Yüksel et al. [4] explain in their study, planning studies for restoration can be listed as follows: Determination of natural landscape areas, development of rehabilitation and planning projects to be implemented for that area, determination of goals and shaping conservation approaches. As a result of these stages, landscape planning after forest fires contributes to the restoration of ecological balance and the sustainable improvement of natural and cultural areas. It also supports strategic decisions for the reuse and protection of degraded areas in the coming years. In this way, the long-term resilience of the ecosystem is strengthened. Engaging in multidisciplinary studies in order for landscape planning and rehabilitation stages to yield healthy results will increase success. The European landscape convention states that different professional disciplines of landscape planning studies should act together [4].

In the wake of crises of this scale, the role of the landscape architecture discipline in post-fire rehabilitation and reconstruction processes is of strategic importance. Landscape architects are interdisciplinary experts who can work at different scales before, during and after a fire. Especially in the "wildland-urban interface (WUI)" regions, which are defined as the residential area-forest boundary, the development of risk-reducing design decisions, the creation of buffer zones and the planning of fire-resistant landscapes play an important role in preventing possible fires [5]. Proper design of many variables such as plant species selection, topography analysis, wind direction, water drainage and access routes plays a critical role in protecting settlements by limiting the spread of possible fires. In line with this, in the face of the increasing devastating effects of wildfires, the profession of landscape architecture is not only repair, but also an active part of the process of creating resilient settlements and ecosystems. This will necessitate landscape architects to assume more powerful and visible roles in disaster management policies and rehabilitation projects.

The aim of this study is to examine the post-fire area in Güzelyalı Village, one of the regions affected by the fire that occurred in 2025 in Çanakkale province, and to make suggestions about the rehabilitation works that can be carried out. At the same time, the measures to be taken against possible fire hazards in the region for the future were discussed.

MATERIAL AND METHOD

As the main material of the study, the settlement of Güzelyalı, where many houses were damaged in the great forest fire in Çanakkale in August 2025, was discussed (Fig. 1). Literature reviews, maps, images related to the study area, on-site interviews and photographs were used as supplementary materials of the study.

Güzelyalı, a coastal village connected to Çanakkale Center, is 15 km away from the center of Çanakkale and covers an area of 255 hectares. Güzelyalı, which shows a transitional climate due to its location, reflects the Mediterranean climate characteristics with its general character [6].

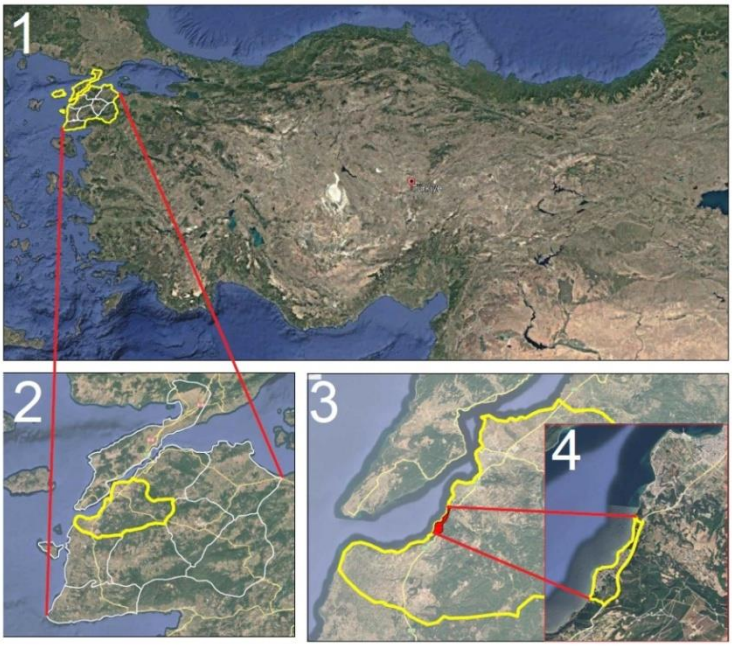

Fig.1. *Location of Güzelyalı village in Çanakkale (Corrected using Google Earth, 2025).*

The method of the study consists of the following stages: In the first stage, the current situation analysis was made, the boundaries of the impact area of the fire in Güzelyalı were determined, and information about the climate data on the day of the fire was obtained. Field investigations were carried out before and after the fire using digital data. In the second stage, the settlements most affected by the fire in the region were determined and the areas that required first intervention in the rehabilitation of the area were examined by using on-site observation and digital data. At this stage, suggestions were made for the areas damaged by the fire. In the third and final stage, regional needs were determined, measures to be taken to prevent fire hazards in the region in the future were determined, and how strategic landscape planning and designs should be after possible fires were discussed.

FINDINGS

Climate characteristic of Çanakkale province

When the temperature data of Çanakkale during the year is examined; it is seen that the minimum temperature is February with -4.2 °C and the maximum temperature is August with +35.8 °C. North winds prevail in the whole region, and the most common winds blow from the north, star, lodos and qibla winds [7]. Looking at these climatic data of the region, the risk of fire can increase significantly in the summer months due to the increase in temperatures, especially in the summer months, and the northerly wind that is effective throughout the year. Changes in wind speed and direction are a

parameter that will cause the course of the fire to change at any time [7]. This situation was very clearly observed in the last fire and was very difficult to control. In addition, according to these climate data, it is seen that long dry months occur. For this reason, the humidity of the forest cover decreases significantly. Considering all these, Güzelyalı village and its surroundings become susceptible to forest fires in the summer months. As a matter of fact, all of these adverse conditions came together in the 2025 fire that occurred in Güzelyalı.

Çanakkale 2025 fire

Anadolu Agency stated in a press release made by Çanakkale Regional Director of Forestry Enver Demirci that 118 forest fires occurred in Çanakkale in August 2025 and 7,039 hectares of forest area was damaged. In addition, 466 non-forest fires were intervened during this period; He states that 86 of the 118 forest fires spread from rural areas to forests. In August 2025, fires broke out in different regions of the Çanakkale region at the same time. In Sarıcaeli village at 13.20; In Bayramiç Yiğitler village at 13.24; The fire started at 13.36 in Çınarlı village and at 16.28 in the Pazarlı region of Gallipoli, which is very comprehensive. According to the provincial director of forestry, although all air and land vehicles and the means of the municipality and the police were mobilized and intervened in coordination in the regions, the occurrence of so many fires in different places simultaneously made it difficult to control and extinguish them. For this reason, the fires lasted for a long time and settlements were damaged in most villages. We can state the resources available in case of fire throughout the province of Çanakkale as follows: 746 personnel, 1 unmanned aerial vehicle, 4 helicopters, 4 planes, 144 vehicles, 8 mobile and 23 tower cameras, 61 water collection pits, 27 fire observation towers. All this is actively used during fires. 222 water tankers have been distributed to the villages to support the fire response. However, it is very important that they are always filled with water [8].

According to BBC NEWS; Interior Minister Ali Yerlikaya reported that the Çanakkale Güzelyalı fire broke out in the Çanakkale rural area on August 11, 2025 and was level 3. The map of the fire, which spread very quickly with the effect of the wind, is shown in Figure 2 [9].

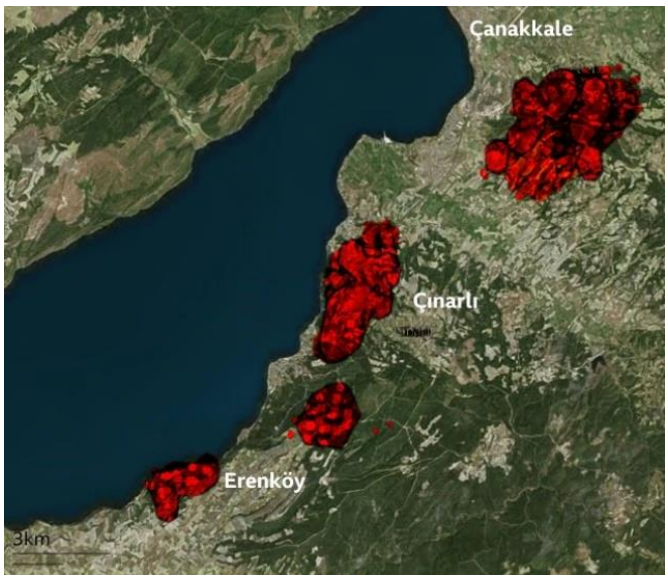

Fig. 2. *Image of fire taken by the Copernicus satellite on August 13, 2025 [9].*

After the fire, many residences and vehicles in Güzelyalı became unusable. Fires that occurred at the same time in different regions made it impossible to intervene, and in most places, the people had to fight with their own means. Some homeowners have wet their homes with hoses and have been able to protect them from burning. However, those who did not have this opportunity suffered serious damage. The fact that the wind is hot and very fast and constantly changing direction has caused panic in the region. This situation was determined in drone images and field investigations taken after the fire (Fig. 3).

Fig. 3. *Drone photos taken from Güzelyalı after the fire* [10].

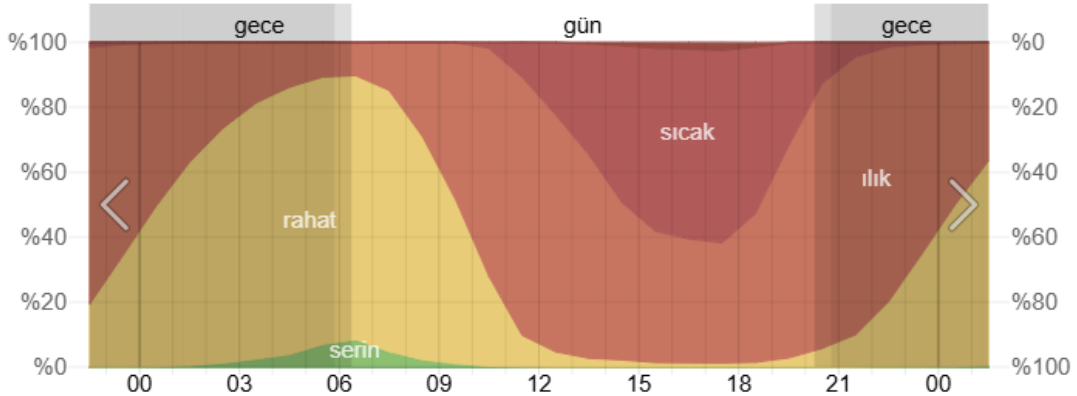

Fig. 4. *Graph showing the temperature status of Çanakkale on August 11, 2025 [11].*

The table created by Weather Spark gives a daily temperature graph of Çanakkale during the day. The overlapping shadowy parts of the colors indicate the night hours. On the horizontal axis, it presents the hourly distribution of a day with hours (00,03,03,09,12,15,18,21,00). When the temperature of the day the fire broke out is examined, it is seen that while comfortable and cool weather prevails in the early hours of the morning in Güzelyalı, the heat layers are rising significantly between 12.00-18.00; It is seen that this interval is in the hottest time of the day, coinciding with the start times of the fire. In the evening hours (18-00), the temperature dropped again and there was a return to warm-comfortable-cool towards night.

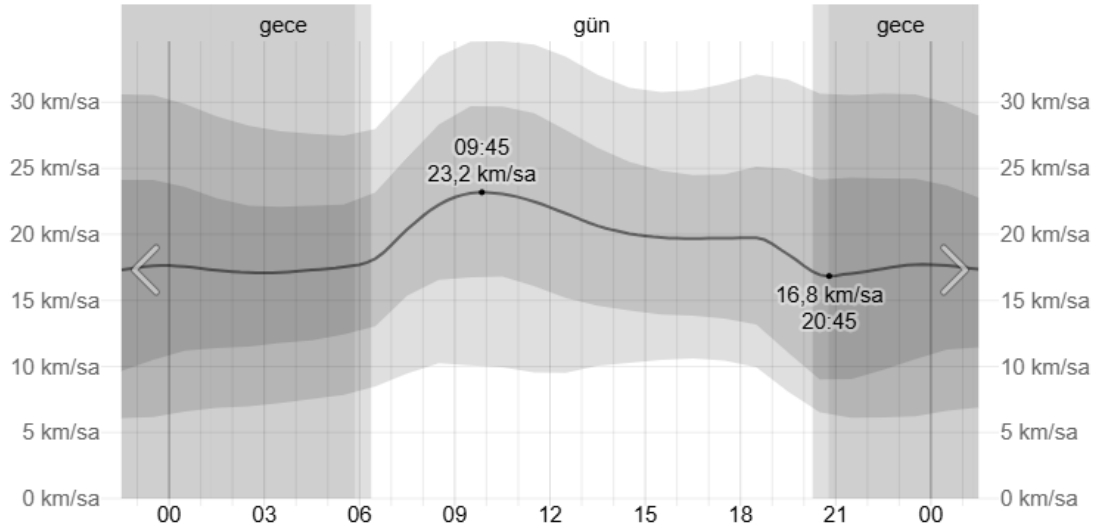

Fig. 5. *Graph showing the wind speed determined in Çanakkale on August 11, 2025 [12].*

According to the wind speed graph of Weather Spark, the average hourly wind speed is shown with a dark gray line. On the horizontal axis, the time zone (light color in the day part, dark color in the night part) is presented. On the vertical axis, the wind speed is given between 0 km/h and 30 km/h according to the time zones on the horizontal axis. These values represent the average hourly speed of the wind. When the graph is examined, the maximum wind speed is determined as 23.2 km/h between 09:00 and 11:00. Later in the day, the wind speed decreased to 16.8 km/h. Such a sudden increase in wind during the day creates danger. Considering that this situation occurs very frequently in the summer months, precautions should be taken, especially near residential areas.

Rehabilitation and risk management after forest fires

In these regions, where plant diversity is rich and the summer months are dry, the creation of fire-resistant areas requires simultaneous planning of both ecological and socio-cultural components. Establishing fire-resistant forests, especially in areas close to settlements, will help to visibly reduce the fire hazard.

For post-fire rehabilitation, the first measures to be taken are to create live fire stopping zones to prevent future fires, to carry out planting works that will act as windbreaks, to convert unused roads into fire safety strips, to organize dense trees by thinning them, and to choose fire-resistant plant species [13]. Buffer zones to be created between residential areas and forests will significantly reduce the possibility of fire spreading to settlements and contribute to the formation of controllable lines for response teams.

When we examine the village of Güzelyalı, which is the subject of the study, it is seen that it was established in the forest area extending from Erenköy to the coast. The lack of buffer zones between the forest and the settlements in the region is one of the most important problems. The fire, which quickly reached the settlements with the effect of the wind, caused significant damage to houses and vehicles (Fig. 6).

Fig. 6. *Güzelyalı's post-fire situation in October, 2025.*

We can show that success is achieved if the right precautions are taken against the risk of fire with the following concrete example: In the fire that broke out in the Gürsu district of Bursa in 2025, the entire forest area of 100 hectares was reduced to ashes, while nothing happened to the nectar garden in Karahıdır District. Even the fruits on the trees in the garden escaped unharmed (Figure 7). The reason why the 25 acres of land belonging to Halil Kiraz was not affected by the fire was that the soil was kept moist with a drip irrigation system, the dry grass under the trees was cleaned regularly and the tree thinning process was carried out between it and the neighboring lands [14].

Fig. 7. *The only green land in Bursa in the middle of the fire [15].*

It is important to use different plant species instead of planting a single species in forests in terms of both creating a fire-resistant ecosystem and protecting biodiversity. Genç et al. [16] In their study, they explain the general characteristics of plants that are resistant to combustion as follows: They should have high water content and soft (flexible) leaves. As the plant ages, it should not have dead zones. Plant sap should be odorless and water structure. They must have a high content of salt, mineral matter and ash, and their bodies are cylinder-like. They should not contain essential oils, paraffins and resins to ensure low flammability.

According to the researches of Ilgar [17], the list of tree and shrub species in the forests under the jurisdiction of Çanakkale Forestry Enterprises is given in Table 1.

Table 1. *List of tree and shrub species generally used by Çanakkale Forestry Enterprises in forests [17].*

Tree and Shrub Species Found in High and Low Areas	**Plant Species Under the Forest**
Pinus nigra	*Thymus seppyllum*
Pinus brutia	*Thymus pulvitanus*
Quercus petrea spp.	*Rubus* spp.
Quercus coccifera	*Paliur-us aculeatus*
Quercus ilex	*Erica arborea*
Platanus orientalis	*Rhus coriaria* L.
Castanea spp.	*Convolvulus* spp.
Coryllus spp.	*Salvinia* spp.
Cistus salvifolius	

Under the leadership of the Çanakkale Governor's Office, a workshop on "Improving the forest ecosystem in Çanakkale" was held on 25-26 November 2025 in cooperation with the Çanakkale Regional Directorate of Forestry and the Provincial Directorate of Agriculture and Forestry. In the workshop, comprehensive evaluations were made on post-fire ecosystem recovery methods, natural regeneration processes, protection of soil and water resources, support of biodiversity, reforestation strategies and coordination between institutions, and information, experience and solution suggestions were shared. The importance of reflecting the scientific studies of academics to the field, sharing the field experiences of technical personnel, and operational support of institutions in the rehabilitation of fire-damaged areas, planning resilient and sustainable settlements was emphasized. It was stated that with the efforts of different professional groups, not only post-fire rehabilitation, but also a stronger forestry understanding should be created in order to prevent fire disasters that may occur in the future.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the study, it was determined that there was a great financial loss in a very short time in the investigations carried out in Güzelyalı village, and the fire, which spread to residential areas, was difficult to control. The area affected by the fire is the residences on the forest border and continued to the sea. The fact that Güzelyalı has the status of a village, that it does not have sufficient personnel and equipment, and that there are large fires in different regions on the same day have made it difficult for the authorities to intervene in the region. This situation increases dependence on external resources in the event of a disaster and leads the society to take precautions with its own means. Due to the high fire risk of the settlements bordering the forest area; It is necessary to increase infrastructure investments, implement risk-reducing planning principles, provide disaster training to the society, and access to the necessary resources for institutions and the public.

Research on the subject shows that one of the cornerstones of successful rehabilitation after forest fires is to prioritize the selection of fire-resistant tree and shrub species in burned areas; This approach not only prevents the spread of fire but also ensures that the ecosystem is more resilient. In the literature research conducted by Özel et al. [18]; It is stated as a basic principle that the priority in post-fire rehabilitation is to protect healthy trees, to make only the necessary pruning for safety and to support the regrowth

of plants. In addition, it was concluded that the protection of soil and habitat integrity will accelerate recovery, and landscaping around residential areas will help to create sustainable and fire-resistant living spaces.

Policies such as the "Rehabilitation of Burned Forest Areas and Fire Resistant Forests Establishment Project (YARDOP)" implemented by the General Directorate of Forestry in Turkey have concluded that making species selections that are suitable for the ecology of the regions and have the potential to renew themselves will create fire-resistant areas [19]. The Turkish Foresters Association also emphasizes the concept of fire resistance and argues that it is imperative for long-term sustainability to choose species that have the capacity to recover from our forests damaged after a fire. As species that renew themselves and give active shoots; "Quercus coccifera, Quercus infectoria Olivier, Myrtus communis, Pistacia spp., Ceratonia siliqua" can be given as examples [20]. Anonymous [21], as fire-resistant plants: Quercus spp. Fraxinus spp., Ceratonia spp., Laurus nobilis, Platanus orientalis, Morus alba, Juglans regia, Prunus dulcis, Celtis australis and Cupressus species. Since these have lower flammability properties than coniferous species, they can be used in suitable growing environments to increase resistance to fire. Thus, conscious plant species selections during rehabilitation will not only reduce the risk of fire spread, but also contribute to the regaining of ecological functions of fire-damaged areas and strengthening the resilience of the ecosystem.

The afforestation area in the Güzelyalı settlement area was analyzed by comparing it with the afforestation principles stated in the studies of Genç et al., Erduran Nemutlu and Çelik [15, 22]. Accordingly, it has been revealed that mixed planting, not just conifers, should be included in the reforestation works of the Güzelyalı region. In Table 2, the plants present in the area are also specified, and the plants that burn hard as fire preventives, form wind curtains and are suitable for natural environment conditions, and low-height trees or shrubs that are resistant to burning on the roadsides in the forest are specified.

Table 2. *Recommendations for Güzelyalı settlement area according to basic planting criteria.*

Plants Used in Güzelyalı Settlement Area	*Pinus nigra* *Pinus brutia* *Pinus pinea* *Quercus sp..* *Olea europeae*
Plants that burn power in fire prevention facilities, create wind curtains and are suitable for natural environment conditions	*Robinia pseudoacacia* *Fraxinus exelsior* l. *Morul alba* *Quercus sp..* *Juglans regia* *Cupressus sempervirens* *Nerium oleander* *Platanus orientalis* *Ceratonia siliqua* *Cercis siliquastrum* *Ficus carica* *Opuntia ficus* *Pistacia terebinthus* *Spartium junceum*
Low-rise trees or shrubs resistant to fire on the roadsides in the forest	*Nerium oleander* *Spartium junceum* Thymus sp. Achiellea millefolium *Erica arborea* *Rubus sp.* *Opuntia ficus* *Yucca spp.*)
Shade trees that can be used in parking areas	*Acer platanoides* *Acer campestre*

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REFERENCES

[1] Anonymous (2023): Orman Yangınları Değerlendirme Raporu, Orman Genel Müdürlüğü, Muğla, Turkey, 1: 9-10 (Access Date: 5.11.2025).

[2] Taş A, Benliay A. (2023): Yanmış orman alanlarının ekolojik restorasyonu için uzaktan algılama ve yapay sinir ağları kullanımına dayalı yaklaşımlar. Eğitim, Bilim, Kültür ve Sanat Dergisi. 7(1): 54-64 (Access Date: 7.11.2025).

[3] Şahin Ş, Perçin H, Kurum E and Mamluk Y. (2014): Akarsu koridorlarında peyzaj onarımı ve doğaya yeniden kazandırma teknik kılavuzu. T.C. Orman ve Su İşleri Bakanlığı, Doğa Koruma ve Milli Parklar Genel Müdürlüğü adına BEL-DA Belde Proje ve Dan. Tic. Ltd. Şti. Ankara, Turkey, 3:1-138 (Access Date: 3.10.2025).

[4] Yüksel A, Meral A, Demir Y, Eroğlu E. (2019): Çapakçur Mikro Havzası'nda (Bingöl) mikro havza ölçekli peyzaj değerlendirilmesi, Türk Tarım ve Doğa Bilimleri Dergisi, 7(1): 16-26 (Access Date: 3.11.2025).

[5] Cohen, J. D. (2000): Preventing disaster: home ignitability in the wildland-urban interface. Journal of Forestry, 98 (3): 15-21 (Access Date: 6.11.2025).

[6] CSB, (2025): Çevre, Şehircilik ve İklim Değişikliği Bakanlığı Resmi Web Sitesi https://canakkale.csb.gov.tr/cografyasi-i-5389 (Access Date: 3.11.2025).

[7] MGM, (2025): Meteoroloji Genel Müdürlüğü, Meteorolojik Karakterli Doğal Afetler, https://mgm.gov.tr/arastirma/dogal-afetler.aspx?s=ormanyangin (Access Date: 3.11.2025).

[8] Alyanak ÇM, Akay B, (2025): Anadolu Ajansı, https://www.aa.com.tr/tr/gundem/canakkalede-118-orman-yangininda-7-bin-39-hektar-alan-zarar-gordu/3671413 (Access Date: 25.11.2025).

[9] BBC NEWS (2025): Çanakkale Yangını https://www.bbc.com/turkce/articles/cjey7q3288eo (Access date: 08.12.2025).

[10] Bozkurt A, Çekil H, (2025): Sivas Haberler, Çanakkale Güzelyalı'daki Yangında Villalar Kül Oldu, https://www.sivashaberler.com/canakkale-guzelyalidaki-yanginda-villalar-kul-oldu/ (Access Date: 5.11.2025).

[11] Anonymous (2025): 11 Ağustos Çanakkale Sıcaklık Bandı, https://tr.weatherspark.com/d/92977/8/11/11-A%C4%9Fustos-tarihinde-%C3%87anakkale-T%C3%BCrkiye-Ortalama-Hava-Durumu#Figures-ColorTemperature (Access Date: 8.11.2025).

[12] Anonymous (2015): 11 Ağustos Çanakkale Bölgesinde Rüzgar Hızı, https://tr.weatherspark.com/d/92977/8/11/11-A%C4%9Fustos-tarihinde-

%C3%87anakkale-T%C3%BCrkiye-Ortalama-Hava-Durumu#Figures-WindSpeed (Access Date: 8.11.2025).

[13] T.C. Çevre ve Orman Bakanlığı Orman Genel Müdürlüğü (2008): Yanan alanların rehabilitasyonu ve yangına dirençli ormanlar tesisi projesi (Serik-Taşağıl), Antalya, Türkiye 1:15-63, (Access Date: 9.11.2025).

[14] NTV, (2025): Bursa'da şaşırtan görüntü: Sadece o alan yanmadı, https://www.ntv.com.tr/galeri/turkiye/bursada-sasirtan-goruntu-sadece-o-alan-yanmadi,DhZ8Xy8PG0iBlRhb8irIgg (Access Date: 3.11.2025).

[15] Milliyet, (2025): Bursa'da şaşırtan görüntü: Sadece o alan yanmadı, https://www.milliyet.com.tr/gundem/bursadaki-yanginin-ortasinda-yesil-kalan-tek-yer-bahce-sahipleri-sirrini-acikladi-7417216 (Access Date: 3.11.2025).

[16] Genç M, Deligöz A, Yıldız D. (2009): I. Orman Yangınları ile Mücadele Sempozyumu 07-10 Ocak 2009, Antalya, Türkiye, T.C. Çevre ve Orman Bakanlığı Orman Genel Müdürlüğü, Ankara, 1:224-235 (Access Date: 8.11.2025).

[17] Ilgar R. (2009): Çanakkale Orman İşletmeciliği yarar analizinin coğrafi bakış açısıyla değerlendirilmesi. Kocaeli Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (17) S:77-99 (Access Date: 5.11.2025).

[18] Özel H, Ateşoğlu A, Kırdar E. (2021): Orman yangınları sonrası yanan alanların ağaçlandırılması, izleme ve değerlendirme. Türkiye Bilimler Akademisi Bilim ve Düşün Serisi, (33): 275-300 (Access Date: 4.11.2025).

[19] Özkan A, İnaç S. (2017): Karaisalı Orman İşletme Müdürlüğü'ndeki Yardop Üzerine İncelemeler. Turkish Journal of Forest Science. 1(1): 59-74 (Access Date: 9.11.2025).

[20] Alan M, Kavgacı A. (2023): Akkemik Ü. Akdeniz ekosistemlerinin evrimi ve biyolojik çeşitlilik. Türkiye Ormancılar Derneği, Orman Yangınları, 1(1):134-156 (Access Date: 5.10.2025).

[21] Anonymous (2024): Orman yangınları ile ilgili basın açıklaması. Orman Mühendisleri Odası Yönetim Kurulu 29 Ağustos 2024 https://www.ormuh.org.tr/haberler/orman-yanginlari-ile-ilgili-basin-aciklamasi-417 (Access Date: 8.11.2025).

[22] Erduran Nemutlu F, Çelik D. (2024): Çanakkale orman yangını alanının rehabilitasyon ve yangına dirençlilik kapsamında irdelenmesi. Peyzaj Mimarlığında Bilimsel Yaklaşımlar Kitabı, 1(1):113-129 (Access Date: 2.11.2025).