

Full Length Research Paper

The structure and importance of fire suppressing organizations in Turkey

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A great number of forest fires with the assistance of weather conditions and mankind activities causes destruction to the forests in Turkey. The duration and reasons of forest fires differ from each other, so it needs to apply different organizations in order to put out these fires. Whatever it is, whether a major or minor forest fire, the important thing is to arrange the correct forest fire suppressing techniques. These techniques are needed to be organized by experienced fire managers.

Key words: Wildfires, incident commanders, fuel management.

INTRODUCTION

Wildfires stir a primeval fear and fascination in most of us. Forest fires can cause the destruction of a large number of trees and the death or displacement of wild animals. Intense combustion not only burns forest and plants on the ground, but also changes forestry structure, forest biology, climate and soil performance (Zhong et al., 2003). Southern and western parts of Turkey are influenced by Mediterranean climate, so there is always a great risk of occurring and spreading of forest fires.

The General Directorate of Forestry declared that a total of 80012 forest fires occurred between 1937 and 2006, burned 1571609 ha of forested area (TGDF, 2009). Each fire burns with different intensity and as meteorological, topographic and plant composition factors change, the nature of the fire changes. This is the main reason why we need to organize different forest fire preventing and suppressing organizations against forest fires. The major components of these organizations are: prevention measures to reduce the number of people-caused fires, detection systems to find and localize fires while they are small, initial attack systems to contain fires before they burn over large areas and large fire management systems that are designed to minimize the damage that results from large fires that is not controlled by the

initial attack system. The organizations should also include fuel modification measures to mitigate the impact of fires that do occur and the use of prescribed fire to fulfil silviculture, wildlife habitat management and other land management objectives. Fire management also calls for (albeit very infrequently in most jurisdictions) conscious decisions to allow some wildfires to burn freely or to be subjected to limited suppression action if and when the net benefit of doing so is thought to be positive (Martell, 2001).

The modernized forest fire prevention techniques help us to suppress forest fires before they spread and become unmanageable major forests. As it is known that, every single forest fire starts as a small fire and if not suppressed, it quickly spread over large areas. Oymen (1989) declared that, it is not difficult to prevent and suppress forest fires with well-organized forest fire fighting organizations.

MATERIALS AND METHODS

Forest fire statistics of Turkey for the period of 1996 - 2006

The forest fire statistics data concerning the last 11 years period of time since 1996 to 2006 were obtained from the General Directorate of Forestry website (TGDF, 2009) and shown at Table 1.

Between the years of 1996 and 2006, the average burned area per a single fire is 4.64 ha (Table 1). It is so crucial to reduce this number, because the average burned area per single fire is an indicator of whether or not a forest fire prevention and suppression

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Table 1. Forest fire statistics of Turkey for the period of 1996 - 2006.

Years	Number of fires		Area burned (ha)		Area burned per a single fire (ha)	
	Annual	Total	Annual	Total	Annual	Periodic average
1996	1645	21142	14922	98170	9.1	4.64
1997	1339		6316		4.7	
1998	1932		6764		3.5	
1999	2075		5804		2.8	
2000	2353		26353		11.2	
2001	2631		7394		2.81	
2002	1471		8514		5.79	
2003	2177		6644		3.05	
2004	1762		4876		2.77	
2005	1530		2821		1.85	
2006	2227		7762		3.48	

organization is successful. On 31st July 2008, Antalya Forest Fire broke out in Serik and Manavgat forests and burned nearly 16 925 ha of forested area (TCFE, 2009). The fire was hardly extinguished after 5 days on 04th August 2008. It not only burned the forests but the villages as well and caused human and animal sacrifices. There are two major facets to the argument of how the wildfire reached such an extent that the fire caused a big damage to the forests in Antalya; a) Prescribed burning undertaken in this area by forest managers was insufficient in reducing fuel levels prior to fire and b) Suppression forces and preventative controls were inefficient in controlling the fire adequately.

Organizational framework in context of forest fire prevention in Turkey

In recent years, the Turkish government has taken a number of measures to improve its capabilities in forest fire prevention and protection. The Republic of Turkey Ministry of Environment and Forestry publish Forest fire protection rules every year. These rules clearly define the forest fire safety responsibilities of the different levels of government. In addition, these rules define in detail the forest fire protection responsibilities of the different government units, government-sponsored institutions, forest enterprises, non-governmental organizations and citizens.

All these actions are taken in accordance with the Turkish Constitution (dated 97.11.1980, nr.2709, section 169), Turkish Forest Law (dated 08.09.1956, nr.6831, section 68-76), government regulations (dated 10.09.1976, nr.7/12520) and Forest Directorate Guidelines (01.01.1995, nr.285) and also according to the obligations of the responsible persons in the Turkish General Directorate of Forestry.

The Ministry of Environment and Forestry and the Turkish General Directorate of Forestry are responsible for the prevention and suppression of fires in forestlands. Headquarters for forest fire management have been set up both in the central government and in local governments and in both central and local forestry directorates, divided into three management levels: provincial, district and local. All these head-quarters include forest fire prevention groups and have established general forest fire prevention offices with full-time workers. Fire suppression activities are carried out using a wide variety of tools, equipment and human and mechanical resources, sometimes including aerial support: fire attack crews, fire personnel, bulldozers, tractors, trucks, water trucks, off-road vehicles, UHF and FM communication radios, telescopes, fire-resistant clothing, chemical retardants, airplanes and helicopters

(Demir et al., 2009).

RESULTS AND DISCUSSION

The suppressing organizations

Forest fire management organizations (fire preventing and suppressing organizations) are emergency response systems but, unlike urban fire, police and ambulance services, they deal with natural processes that can have both beneficial and detrimental impacts on people, property, forest resources and ecosystems (Martell, 2001).

Putting out forest fires needs the cooperation of effective strategy, tactic and specialization. If the reasons of forest fires are known exactly, then we can take all the necessary steps to reduce the number of fires and succeed in putting out them before it burns large areas. Up to the present time, two main types of forest fires: surface and crown fires have occurred in Turkey. Any major forest fire is a combination of these forest fire types. Major fires are typically spread by fine fuel: pine needles, leaves, grass, etc, both on the surface and in the tree crowns. Martin and Brackebusch (1974) noted that only 5% of large tree stems and 10% of tree branches were consumed in high intensity fires, while 100% of the foliage and 75% of the under story vegetation were consumed. Finally, ladders (small trees and dense undergrowth) of fine and small fuels between the surface and the tree crowns can spread surface fires into the canopy, thus turning a surface fire into a crown fire (Brown and Davis, 1973). Fighting against forest fires needs to do courageous struggles and this happen by means of well-established organizations.

In the administration of forest fire suppressing organizations, there should be just only one authorized manager named Incident Commander. Additionally, the forest fire workers should be well educated and trained (Mol and Kucukosmanoglu, 1989a).

Putting out forest fires includes two main steps: (1)

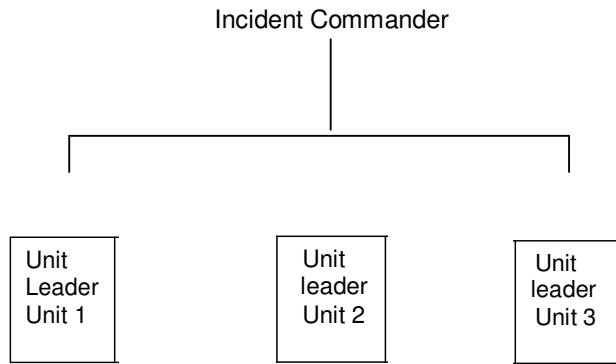


Figure 1. The organization against minor fires.

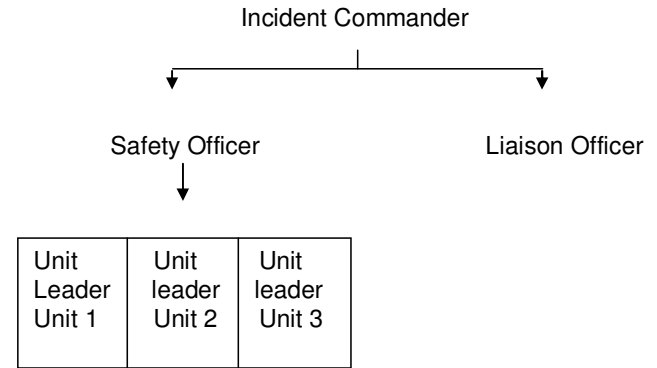


Figure 2. The organization against middle – scaled fires.

Controlling the fires and (2) Suppressing the fires. These two steps are differing from each other, so the planning and organization of related steps should be different (Oymen, 1989).

According to the statistics given above, the fires burn different amounts of forested lands. For this reason, we can say for every started fire that, according to the evaluation and spreading of the fire the elements of organizations need to contain different structure. Not to forget the effectiveness of the initial attack force will depend upon its composition, how soon it arrives at the fire, the fuel and terrain in which the fire is burning and the fire's behaviour. Most forest fires in Turkey are contained when they are relatively small, but some escape from initial control attempt and can spread out rapidly. Such fires like Antalya Forest Fire can seldom be controlled until favourable weather conditions arrive and persist long enough for the fire fighters to establish control lines that are strong enough to contain the fire if and when weather conditions subsequently deteriorate.

The structure of fire suppressing organizations in different types of fires

(1) Newly started fires: A number of workers can easily put out this type of fires. We do not need any type of organization and an experienced fire manager. Inhabitants of forest villages or picnickers can also extinguish this type of fires, if not the fire can get out of control and spreads.

(2) Minor fires: At least 10 - 30 workers should be occupied for this type of fires (Figure 1). If only one unit puts out the fire, the most experienced fire worker is selected as an incident commander. In case of spreading of the fires, two or more reinforcement units (unit 2 and unit 3) should support this unit (unit 1).

(3) Middle-scaled fires: This type of fires requires approximately 60-100 workers. The topographic structure, transportation availabilities and communication network also affect the number of required staff. In this kind of organization type safety and liaison officers are also

included (Figure 2). The incident commander is the responsible manager and administrates the suppression forces.

(4) Major forest fires: According to Kucukosmanoglu (1987), the forest fires burn more than 500ha of forested area are called 'Major forest fires'. In Turkey Adana, Adapazari, Antalya, Balikesir, Bursa, Çanakkale, Elaziğ, Eskişehir, İstanbul, İzmir, Kahramanmaraş, Mersin and Muğla Provinces are the places where this kind of fires can be seen regularly (Figure 3). Muğla, Antalya, İzmir and Çanakkale Forest Districts have the most fire-susceptible forests. Almost every summer, flora and fauna of valuable protected areas in Mediterranean forest zones are lost.

On struggling major fires, under the head of the organization manager (incident commander), there are finance, logistics, planning and operations sections (Figure 4). Bulldozers, Tractors, Sprinklers, Aeroplanes, etc, are used in order to put out these large fires (Mol and Kucukosmanoglu, 1989b). For example: Turkish General Directorate of Forestry has used 26 helicopters, 9 fire-fighting planes, 666 sprinklers, 137 bulldozers, 126 graders, 100 trailers, 38 loaders, 144 water tanks and 366 4x4 vehicles for forest fire fighting. In addition, 10617 forest fire fighters, 1750 technical and administrative personnel, 1000 soldiers and 7500 forest villagers have been working in forest fire fighting. High borrowing costs could deter fire incident commanders from borrowing air tankers, which could produce air tanker shortages, longer initial attack response times and more escaped fires that can threaten towns, cities and cause disasters. The incident commanders should also transmit their predictions concerning the cost of achieving the specified fire management targets and their assessment of the social, economic and ecological impacts of the fire behavior.

1. Incident commander: This is the person who is responsible for the putting out of forest fires. This experienced fire manager is the highest authorized person and is the head of the whole organization. Finance, logistics, planning and operations sections give information to him.

2. Finance section: The section deals with purchase, sale

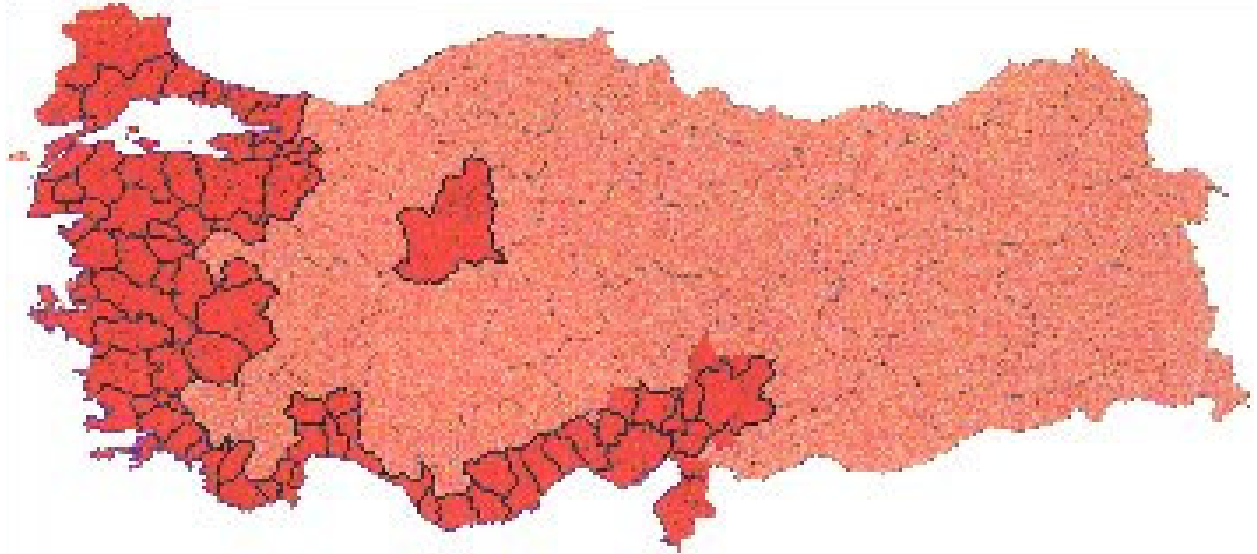


Figure 3. Provinces affected by wild fires.

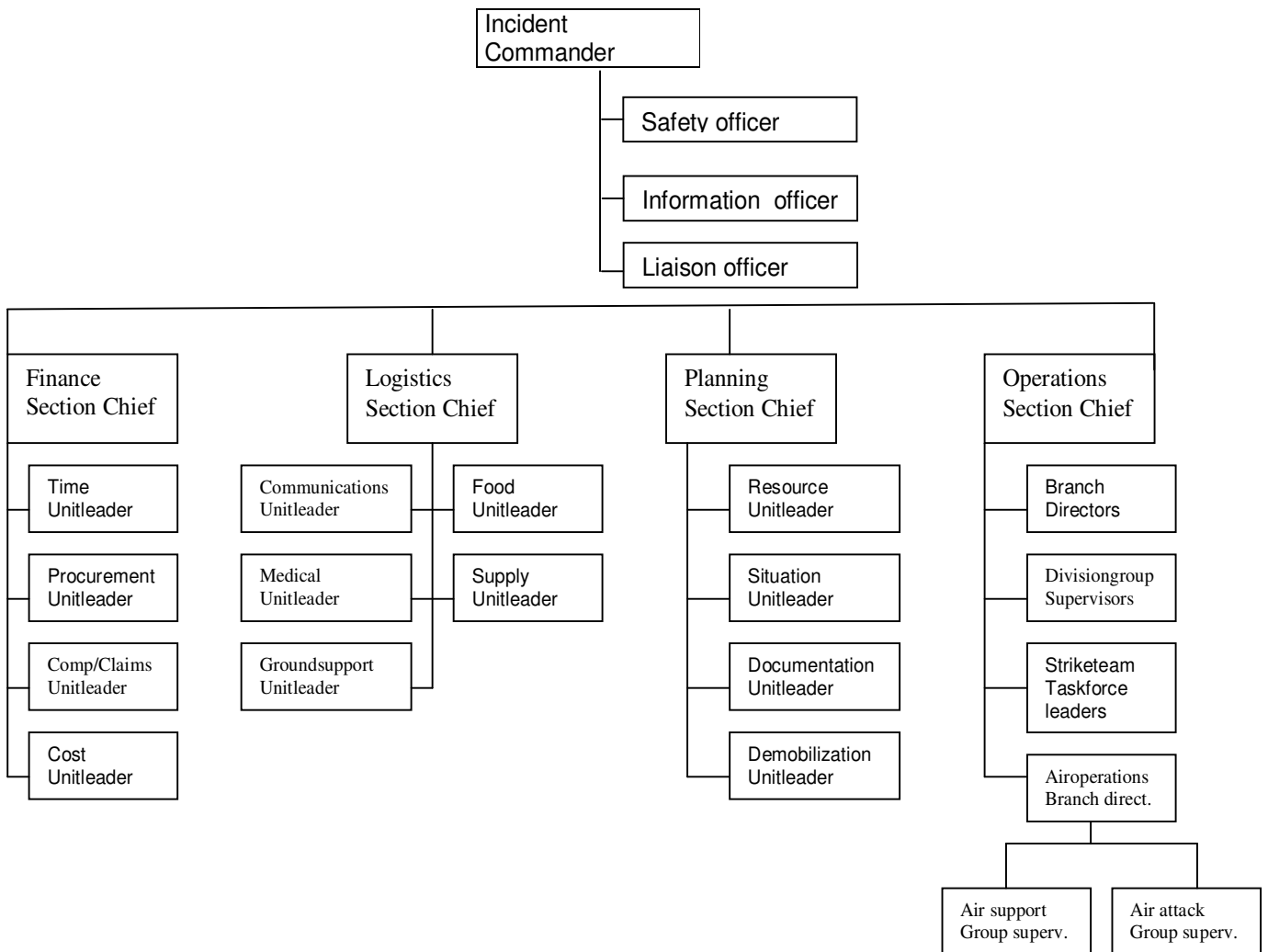


Figure 4. The organization against major forest fires.

and acquisition activities. The cost of supporting fire management personnel working in the field, the annual cost of fixed assets such as aircraft, fire suppression equipment, buildings, communications and information systems is in the responsibility of the finance section.

3. Operations section: This section consists of all the staff that is occupied as fire fighters. Well-trained fire fighters are the most essential skilled personnel that cannot readily be replaced. Air support and air attack groups are also involved in this section. Safety officer is the head of this section.

4. Logistics section: This section gathers all the vehicles and equipments. The section is also responsible for communications and supplying medical kits, food and water. Liaison officer is the head of this section.

5. Planning section: This section makes all the plans and records. This section collects information and gives the useful data to the information officer.

Conclusions

Fire is a natural element and plays an important role in the natural dynamics of the forest ecosystems. However, fire can be a very destructive force. According to the establishment of new and modern fire prevention and suppression techniques, the number of fires and burning area will be getting decreased. Adverse burning conditions will occur in the future as they have been in the past. The important measures to be taken are firstly to keep away the fire from the forests and secondly to suppress the fire immediately and effectively as it is still at the beginning stage. The sooner a fire is detected and reported, the larger the initial attack force and the quicker it arrives at the fire, the more likely the fire will be contained at a small size. This could be realized by effective protective measures and well-trained fire fighting teams using appropriate high technology and equipments (Ayberk, 2003).

The fighting against forest fires should only be realized by means of well-coordinated organizations. Education of people, sanctions in the law and reclamation of economical opportunities are the other factors to fight against fires. Fuel treatments have been proposed to reduce the wildfire threats. The objective of the fuel management subsystem is to modify forest vegetation or fuel complexes to reduce the likelihood that fires will occur and to stop or slow the spread of fires and thereby reduce the social, economic and biological impacts of fires that do occur. It includes the construction and maintenance of fuel breaks, extensive thinning or fuel modification and the use of prescribed fire to modify fuels to reduce their flammability, for silvicultural purposes, or to enhance wildlife habitat. Prescribed burning setting fires under specified conditions can reduce the fine fuels that spread wildfires, but can escape and become catastrophic wildfires, especially if fuel ladders and wind spread the fire into the forest canopy. It should also be recognized that,

as long as there is biomass, drought and high winds, catastrophic wildfires would occur. Only about 1% of wildfires become conflagrations, but which fires will 'blow up' into catastrophic wildfires is unpredictable. It seems likely that management practices and policies, including fuel treatments, affect the likelihood of such events. However, past experiences with wildfires are of limited value for building predictive models and research on fire behaviour under various circumstances is difficult, at best. Thus, predictive tools for fire protection and control are often based on expert opinion and well-coordinated organizations (Gorte, 2006).

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