FORESTRY IDEAS, 2016, vol. 22, No 2 (52): 214–220

FOREST-FIRE PROTECTION INFRASTRUCTURES IN NATURAL PROTECTED AREAS WITH MANAGEMENT BODIES IN GREECE

Konstantinos S. Tsiolis[1*] and Georgios Sp. Efthimiou[2]

[1]Forester, Fire Brigade Officer, 43100 Karditsa, Greece. [*]E-mail: kostaskard@hotmail.com
[2]Department of Forestry and Natural Environment Management, Technological Educational Institute of Sterea Hellas, 36100 Karpenissi, Greece.
E-mails: gefthi@yahoo.gr, efthimiou@teiste.gr

Received: 12 March 2015 Accepted: 19 December 2016

Abstract

The recent global climate change has already increased the risk of fire in Mediterranean forests, including protected natural areas. The adaptation options for fire protection that are related to forest fires and to climate change contain measures, which are relative to the management of biomass, the prevention and fighting of fires with proper infrastructure and, above all, with public sensitization. This research endeavours to examine the current situation of the above measures and to evaluate the 28 Management Bodies (M.B.) that are responsible for the corresponding 28 protected areas of Greece. As a research tool, the questionnaire method was used, in order to record and to evaluate the views of the land-use managers and scientists in each of the 28 Protected Areas (P.A.). The survey reveals differences among the various national parks with regard to fire-protection measures, as well as to the effectiveness of fire-fighting and public commitment, which were estimated to be more important than the management of fuel biomass. The results were evaluated in the light of a critical review of measures used in preventing and managing fires.

Key words: activity of the M.B., fire-fighting, fire prevention, fire-protection measures, Mediterranean forests, national parks.

Introduction

The Mediterranean region is intrinsically linked to fires (Tsagari et al. 2011). Their intensity and recurrence make them the root cause of the degradation and shrinkage of Mediterranean forest ecosystems. Besides the forest fires, Mediterranean forests are very vulnerable and fragile to other numerous threats, such as over exploitation, deforestation and degradation. These threats are currently accentuated within the context of climate and land-use changes (Palahi et al. 2008). The fireproof protection, as a mean of prevention, constitutes an important measure in protecting and conserving natural ecosystems, diversity of the Mediterranean landscape and biodiversity.

Handling forest fires in Greece constitutes an acute problem, because, on the one hand, fires are the main threat to the country's forests, and in combination with overgrazing, are the main cause of the

desertification of mountainous and semi-mountainous regions. On the other hand, climatic and meteorological conditions are key factors for both the occurrence and development of forest fires.

Material and Methods

The study started with a survey on the international bibliography on issues concerning protected areas and especially fire protection (prevention and suppression of fires) of national parks.

The 28 Protected Areas of Greece that are managed by a corresponding number of Management Bodies constitute the object of this study, as shown in Figure 1.

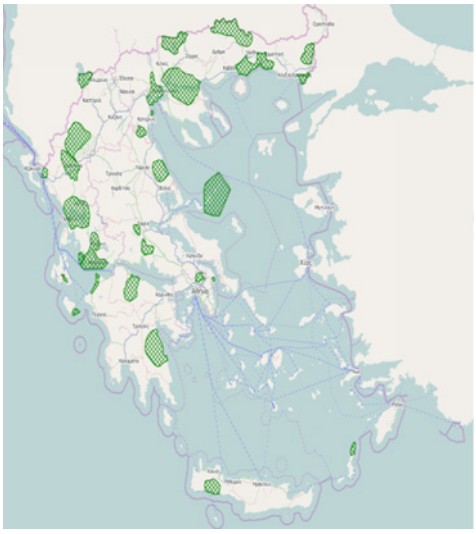

Fig. 1. Map of Greeks protected areas with Management Body (YPEKA 2015).

Research was carried out by means of a questionnaire that was prepared and sent to the 28 active Management Bodies by electronic mail. The information of the completed questionnaires was recorded electronically and processed statistically. This survey was conducted from October 2011 to April 2012.

Descriptive statistics was applied for data analysis using the software SPSS 19.0.

Results and Discussion

The questionnaires that were completed by all 28 of the Management Bodies in Greece (see Table 1) and filed electronically revealed the following data about each Management Body:

a) Documentation of each Management Body's existing firewall infrastructure (Table 2);

b) Grouping of fire-protection operations in the Protected Areas with M.B. (Table 2);

c) Cataloguing of the Management Bodies that use new technologies for fire safety (e.g. the use of satellite data) (Table 2).

The results of processing the questionnaires could be summarized as follows:

1) With regard to issues of infrastructure and agencies, 71.4 % of Management Bodies (MB) have drafted a protection or guard plan in the protected area of their administrative territory, while all M.B. must draft such a plan immediately. On the contrary, only two M.B. had drafted a study for fire protection during the time period when the survey was conducted.

2) 64.3 % of M.B. apply new technologies, such as satellite data, while only the M.B. of the National Forest of Samaria uses electronic system (E/T) or models of forest-fire management (Tsiolis and Efthimiou 2014).

3) 33 % of the MB report that they have no involvement in the management of forest fires. The M.B. of the National Park of Olympus introduces implementation programs of fire management. Furthermore, only two M.B. (Olympus and Samaria) use fuel maps.

Table 1. The 28 Management bodies (M.B.) of the protected areas in Greece.

Plot, No	Name of Management Body
M.B. 1	M.B. of the National Park of Olympus
M.B. 2	M.B. of the National Park of Parnassos
M.B. 3	M.B. of the National Park of Parnitha
M.B. 4	M.B. of the National Park of Samaria
M.B. 5	M.B. of the National Park of Vikos, Aoos and Pindos
M.B. 6	M.B. of the National Park of Prespa
M.B. 7	M.B. of the National Park of Ainos
M.B. 8	M.B. of the National Park of Iti
M.B. 9	M.B. of the National Park of Evros Delta
M.B. 10	M.B. of the Forest of Dadia
M.B. 11	M.B. of the lake of Kerkini
M.B. 12	M.B. of the lagoon of Messolonghi
M.B. 13	M.B. of the Delta of AxiosLoudias-Aliakmona
M.B. 14	M.B. of the lakes of Koronea-Volvi
M.B. 15	M.B. of the National Marine Park of Alonissos, Northern Sporades
M.B. 16	M.B. of the Nestos Delta, Vistonida, Ismarida
M.B. 17	M.B. of the Mount of Parnona and of the Wetland of Moustos
M.B. 18	M.B. of the lake of Pamvotida
M.B. 19	M.B. of the Amvrakikos wetlands
M.B. 20	M.B. of the wetland of Kotychi, Strofylia
M.B. 21	M.B. of the Strait & Estuaries Acheron & Kalama
M.B. 22	M.B. of the Chelmos, Vouraikos
M.B. 23	M.B. of the Mountain Chain of Rhodope
M.B. 24	M.B. of the Karpathos, Saria
M.B. 25	M.B. of Ecodevelopment Area of Karla, Mavrovouni, Kefalovriso, Velestino of Karla
M.B. 26	M.B. of the National Marine Park of Zakynthos
M.B. 27	M.B. of the National Park of Schinia, Marathon, Attica
M.B. 28	M.B. of the National Park of Tzoumerka, Peristeri and gorge of Arachthos

4) The majority of MBs participate in meetings with other agencies regarding fire-protection issues. Nevertheless, only 32.1 % of M.B. have analogous activities and collaboration with Rescue Teams. Only 32 % of M.B. have fire protection. Only 35.7 % of M.B. perform joint patrols with other agencies.

5) Only one third of M.B. have progressed with regard to informing citizens about fire-prevention/fire-protection issues.

6) 14.3 % of M.B. have fire-fighting vehicles. The M.B. of the National Park of Parnitha has the largest number of fire-fighting vehicles (Tsiolis and Efthimiou 2014).

7) Ten out of the 28 M.B. (only 35.7 %) have water-intake points (taps). The M.B. of the National Park of Parnitha has the largest number of water-intake points (141).Nine out of 28 M.B. (only 32.1 %) have cisterns (Tsiolis and Efthimiou 2014).

Table 2. Management bodies' infrastructure actions and agencies for fire protection.

Management body (M.B.)	Protection plan or guard plan	Studyoffireprotection	Meetings with bodies on fire protection subjects	Cooperation with Rescue teams and Fire protection	Joint patrols with other bodies	Informing citizens about prevention – Fire protection	Use of satellite data	Using of the electronic system (E/T) or models of the forest fire management	Use of fuel maps
M.B. of Olympus	√		√	√	√		√		√
M.B. of Parnassos	√						√		
M.B. of Parnitha	√	√	√		√	√	√		
M.B. of Samaria	√	√	√	√	√		√	√	√
M.B. of Vikos-Aoos	√		√			√			
M.B. of Prespa	√		√			√			
M.B. of Enos	√			√			√		
M.B. of Iti									
M.B. of Evros Delta	√		√						
M.B. of Dadia			√	√					
M.B. of Kerkini			√				√		
M.B. of Messolonghi			√		√		√		
M.B. of Axios, Loudias					√		√		
M.B. of Koronea-Volvi	√			√	√		√		
M.B. of Alonissos	√		√			√			
M.B. of Nestos Delta	√		√		√				
M.B. of Parnona			√	√		√	√		
M.B. of Pamvotida	√						√		
M.B. of Amvrakikos wetlands									
M.B. of Kotychi-Strofylia	√		√		√		√		
M.B. of Acheron & Kalama	√						√		
M.B. of Chelmos-Vouraikos	√		√			√	√		
M.B. of Rhodope	√		√				√		
M.B. of Karpathos, Saria	√			√					
M.B. of Karla, Mavrovouni	√		√	√	√	√	√		
M.B. of Zakynthos	√		√				√		
M.B. of Schinia, Marathon	√		√	√	√	√			
M.B. of Tzoumerka, Peristeri						√	√		
Total, number	20	2	18	9	10	9	18	1	2
Share, %	71.4	7.1	64.3	32.1	35.7	32.1	64.3	3.6	7.1

8) The M.B. of the National Park of Parnitha has the largest number of tanks (68), followed by the M.B. of the National Park of Olympus (16) (Tsiolis and Efthimiou 2014).

9) Twelve out of the 28 M.B. (42.9 %) stated that they have fire observatories. However, it has not been ascertained if

these observatories are manned.

10) With regard to fire-fighting in forests and fire-fighting in general, it has been ascertained that only one out of four M.B. take part actively.

11) With regard to fire-prevention and infrastructure resources, the M.B. of the National Park of Parnitha has more resources and infrastructures than the other M.B. and is better organized with regard to materials and instruments. There is a trans-national cooperation among Mediterranean and European countries on issues of mutual assistance in circumstances of major fires and exchange of fire-fighting equipment, education and technology (Martinez et al. 2006, NKUA 2012).

The use of the fireproof method was applied also in Greece, when the fighting of forest fires was among the Forest Service's responsibilities (Law 2612/1998).

It has been stated that Switzerland only manages forest fuels, whereas France carries out land cleaning by means of animal grazing (NKUA 2012).

In Greece, several laws related to forest protection, forest fire-fighting and fire-protection infrastructures have been issued, amended and replaced.

Similarly, we can also refer to the European legislative framework, such as the Council for the EU Forestry Strategy, which, in its resolution of December 15, 1998, called on the Commission to proceed to a constant evaluation, to an improvement of the effectiveness of the European surveillance system regarding forest health and to a consideration of all potential impacts on forest ecosystems. It also called on the Commission to pay special attention to the development of the Community-system information regarding forest fires, which allows a better assessment of the effectiveness of fire-protection measures (Regulation EC No 2152/2003).

The protection of forests against fires is an issue of particular importance and urgency, in order to combat, among other things, desertification and to avoid the negative effects of climate change. It is crucial to avoid any interruption of operations on behalf of the Member States under Regulation (EEC) No 2158/1992, which has expired. Therefore, Regulation (EC) No 2152/2003 of the European Parliament should cover preventive measures, which are not covered by Regulation (EC) No 1257/1999 and are not included in the national or the regional development programs for rural areas.

According to the Resolution of the European Parliament (2010), fires comprise a source of destruction for forests, agricultural crops, and residential areas as well. Because forests are important for timber production, conservation of biodiversity, prevention of floods, avalanches and erosion, management of underground water resources and carbon sequestration, the fires should be an issue of concern for all Member States. Therefore, the European Parliament (EP) requests that the Commission, in cooperation with Member States, implement legislative proposals and initiatives in the field of forest protection and fire prevention. The EP maintains that plans for afforestation/reforestation should be strengthened, preferably on native species and mixed forests, for the benefit of biodiversity and for greater resistance to fires, storms and pests, as well as for the constant collection and use of residual forest biomass, which is a renewable source of energy.

The purpose of this study was to record and to evaluate fireproofing measures of Management Bodies that have been established and set up in Greece by virtue of Law 3044/2002 for the management and protection of the Protected

Areas within their jurisdictions. Presently, 28 Management Bodies are operating in Greece (Table 1), which manage a corresponding number of national parks in the country, as provided by the Laws 2742/1999 & 3044/2002 (Efthimiou 2015).

Conclusion

The results of this study revealed that there are weaknesses and deficiencies in the Management Bodies' agencies and equipment. The immediate registration and demarcation of Protected Areas in Greece is essential, along with the drafting of forest maps. Fire-protection plans must be drafted for Protected Areas and implemented, in order to protect biodiversity as well.

Further research is needed, in order to create a database and an organized Geographic Information System (GIS, use of new technologies, etc.) in all Management Bodies of Protected Areas. In this way, a more effective management of forests can be achieved.

Therefore, it is necessary to consider the results of this study, in order to estimate right the risk of forest fires in Greece. For the protection of national parks, however, the implementation of fire-prevention measures is critical, especially during the summer season.

Finally, from the survey conducted with the Management Bodies of Greece, it appears that there is a general need of the improvement and supply with equipment and instruments and for the implementation of fire-protection measures.

Acknowledgment

The authors wish to thank all Management Bodies of Protected areas of Greece, for their participation in our survey.

References

Efthimiou G. 2015. The Management of Protected Areas in Greece: Manolas E. (Ed.), Environmental Policy: Theory and Practice. Volume in Honour of Alkibiadis Dervitsiotis, Orestiada: Department of Forestry and Management of the Environment and Natural Resources, School of Agricultural and Forestry Sciences, Democritus University of Thrace: 64–75 (in Greek).

European Parliament (EP) 2010. A Community approach on the prevention of natural and man-made disasters (2009/2151(INI)) Available: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P7-TA-2010-0326+0+DOC+PDF+V0//EN: 1–9.

Law 2612/1998. Greek Forest Protection And Forest Development Legislation, Forest Protection – Fire Suppression (FEK 112).

Laws 2742/1999. Greek Forest Protection And Forest Development Legislation, Other Themes (FEK 207).

Law 3013/2002. Upgrade civil protection and other provisions (FEK 102).

Law 3044/2002. Established on Management Bodies (FEK 197A).

Martinez R., Stocks B.J., Truesdale D. 2006. Global Forest Resources Assessment 2005 – Report on fires in the North American Region. Fire Management Working Papers, Working Paper FM/15/E. Forestry Department. Food and Agriculture Organization of the United Nations. FAO, Rome, Italy: 2–10, 18–27.

Ministry of Environment, Energy and Climate Change (YPEKA) 2015. Map of Greeks protected areas with Management Body, Available: http://geodata.gov.gr/maps/?locale=el (Date of Access 16-11-2015).

National & Kapodistrian University of Athens (NKUA) 2012. Forest Cities, National Report on Existing Structure and Management Framework. Laboratory on Prevention and Management of Natural Hazards. (Project LIFE08 ENV/GR/000553), Athens: 5–23.

Palahi M., Mavsar R., Gracia C., Birot Y. 2008. Mediterranean forests under focus, International Forestry Review 10(4): 676–688.

Council Regulation (EEC) No 2158/1992 on the protection of the Community's forests against fire.

Council Regulation (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations.

Regulation (EC) No 2152/2003 of the European Parliament and of the Council concerning monitoring of forests and environmental interactions in the Community (Forest Focus).

Tsagari K., Karetsos G., Proutsos N. 2011. Forest fires in Greece, 1983–2008. World Wildlife Fund – Greece (WWF-Greece) and National Agricultural Research Foundation – Institute of Mediterranean Forest Ecosystems and Forest Products Technology (N.AG.RE.F.–IMFE&FPT). 19 p.

Tsiolis K., Efthimiou G. 2014. A first approach to fire management of protected areas in Greece. Annals of the University of Craiova XIX(LV): 607–612.