Republic of Lebanon
Ministry of Environment

State of Lebanon's wildfires in 2019

"This report was produced within a collaborative framework between the Department of Ecosystems at the Ministry of Environment and the Land and Natural Resources Program at the Institute of the Environment, University of Balamand".

- Published in 2020 -

1. SCOPE

In 2013, a collaborative work was initiated between the Ministry of Environment (MOE) and the Institute of the Environment, University of Balamand (IOE-UOB), regarding the execution of the data analysis related to wildfires in Lebanon. The main goal of this collaboration is to produce a yearly report on wildfire occurrence and the extent of burned areas in Lebanon.

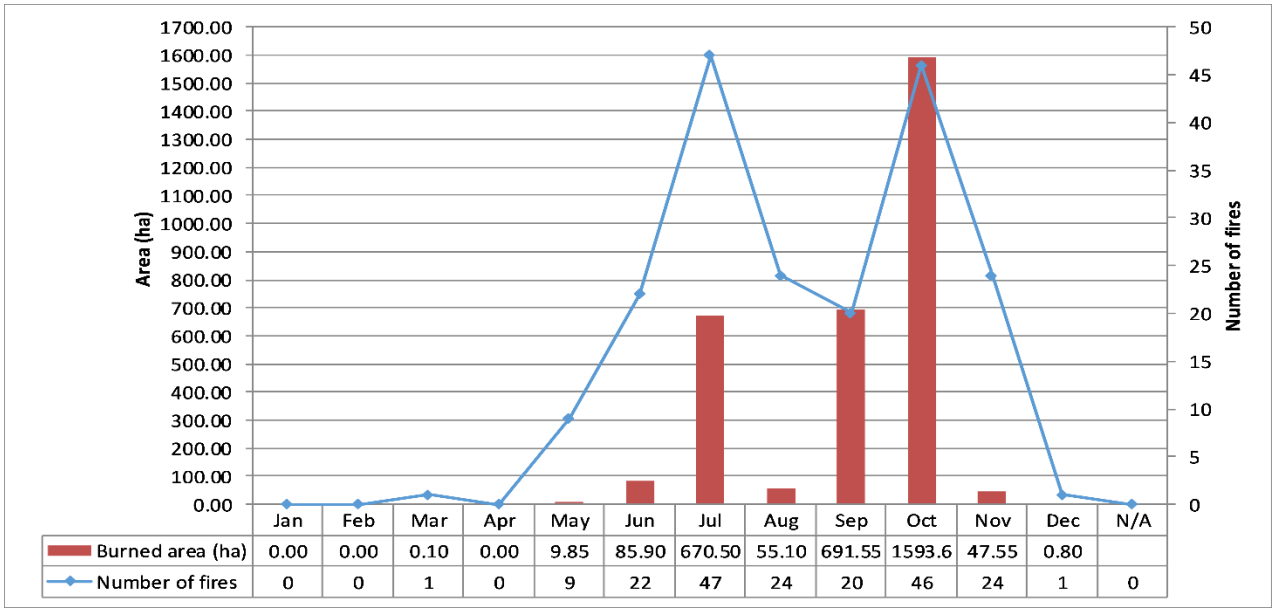
The analysis is done based on the data provided in the fire ID cards filled in by the Internal Security Forces (ISF) and copied to the Ministry of Environment, knowing that the fire ID cards format was issued through the notification of the Presidency of Council of Ministers number 256 dated on 1/3/2008. The report comes in line with the highlights of the technical requirements of Lebanon's National Strategy for Forest Fire Management (endorsed by Council of Ministers Decision No. 52 dated 13/5/2009) by working towards the unification of fire information and data as a means to empower efforts in understanding better the problem of wildfires in Lebanon.

2. FIRE DANGER IN THE 2019 FIRE SEASON

The calculated start date of the fire danger season for 2019 was 23 of May, and the calculated end date was 15 November 2019. The peak month (in number of fires) was July (a total of 47 fires damaging a minimum area of 670.5 ha of vegetated land).

3. FIRE OCCURRENCE AND AFFECTED AREAS

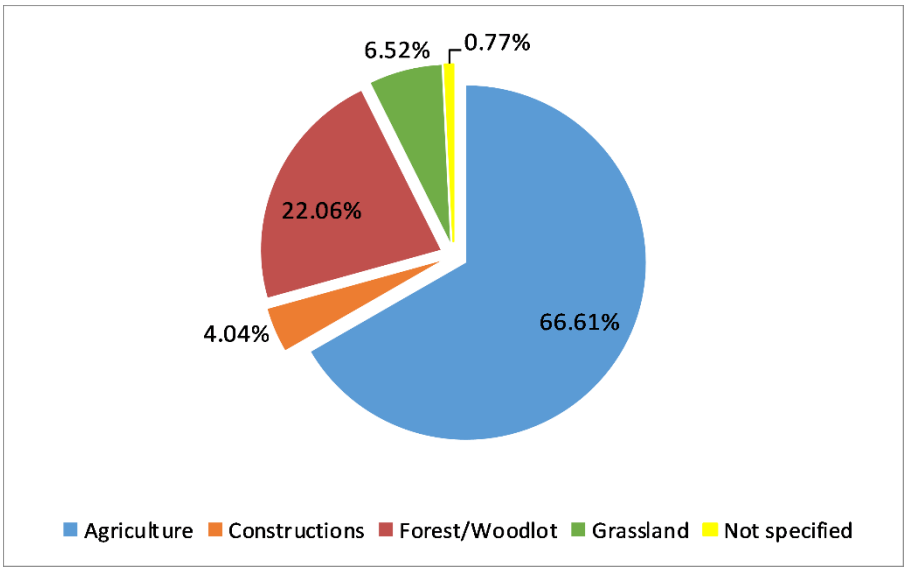
In 2019, a total of 194 fires were reported (Annexes 1 and 2), affecting a total area of 3,155 ha (Figure 1).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	N/A
Burned area (ha)	0.00	0.00	0.10	0.00	9.85	85.90	670.50	55.10	691.55	1593.6	47.55	0.80	
Number of fires	0	0	1	0	9	22	47	24	20	46	24	1	0

Figure 1. Monthly distribution of fire occurrence and fire affected areas in 2019

The main land cover/land use of fire affected areas (Figure 2 upper) comprised agricultural land (66.61%), forest/woodlot (22.06%), and grassland (6.52%); a total of 34.58% of fire affected lands were privately owned, 29.82% were public lands, and 35.59% comprised not specified type of land ownerships (Figure 2 lower).



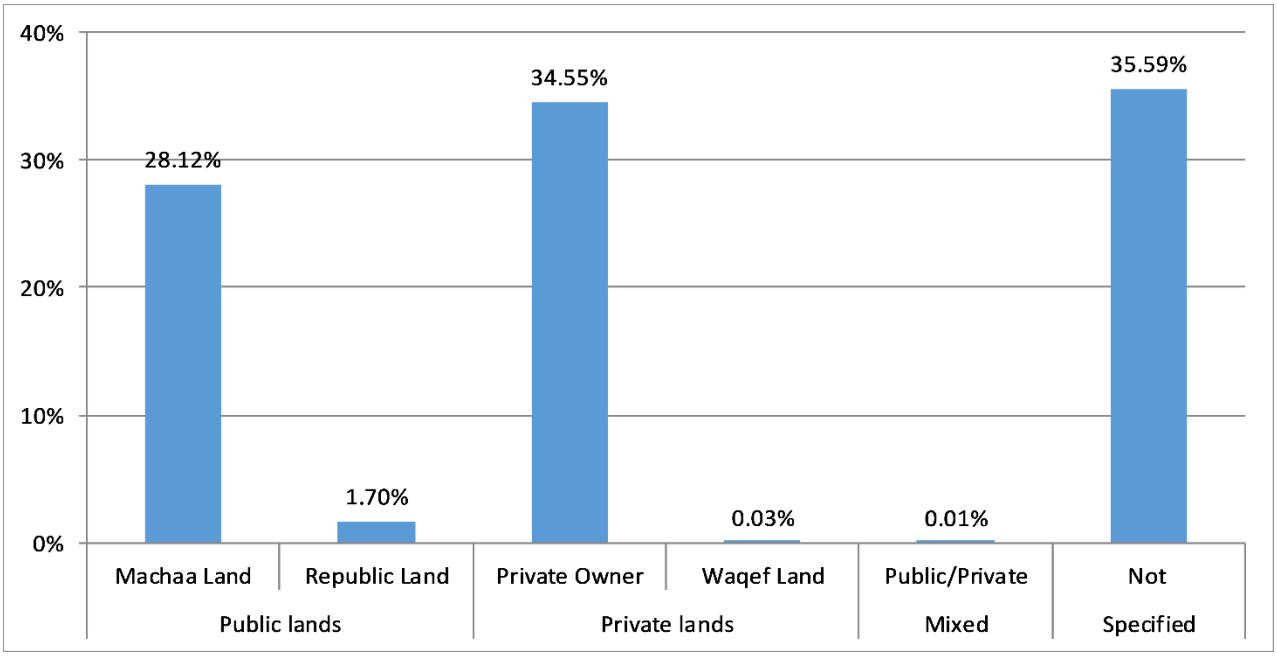


Figure 2. Land cover/Land use of fire affected areas (upper) and ownership of fire-affected areas (lower)

Wildfires occurred in 23 out of 26 Caza (i.e., Kadaa). More specifically, the Caza of Marjeoune was the most affected by number of fires (37 fires), followed by Sour with a total of 25 fires (Figure 3 upper). The Caza of Chouf alone was affected by 2024.4 ha (Figure 3, lower).

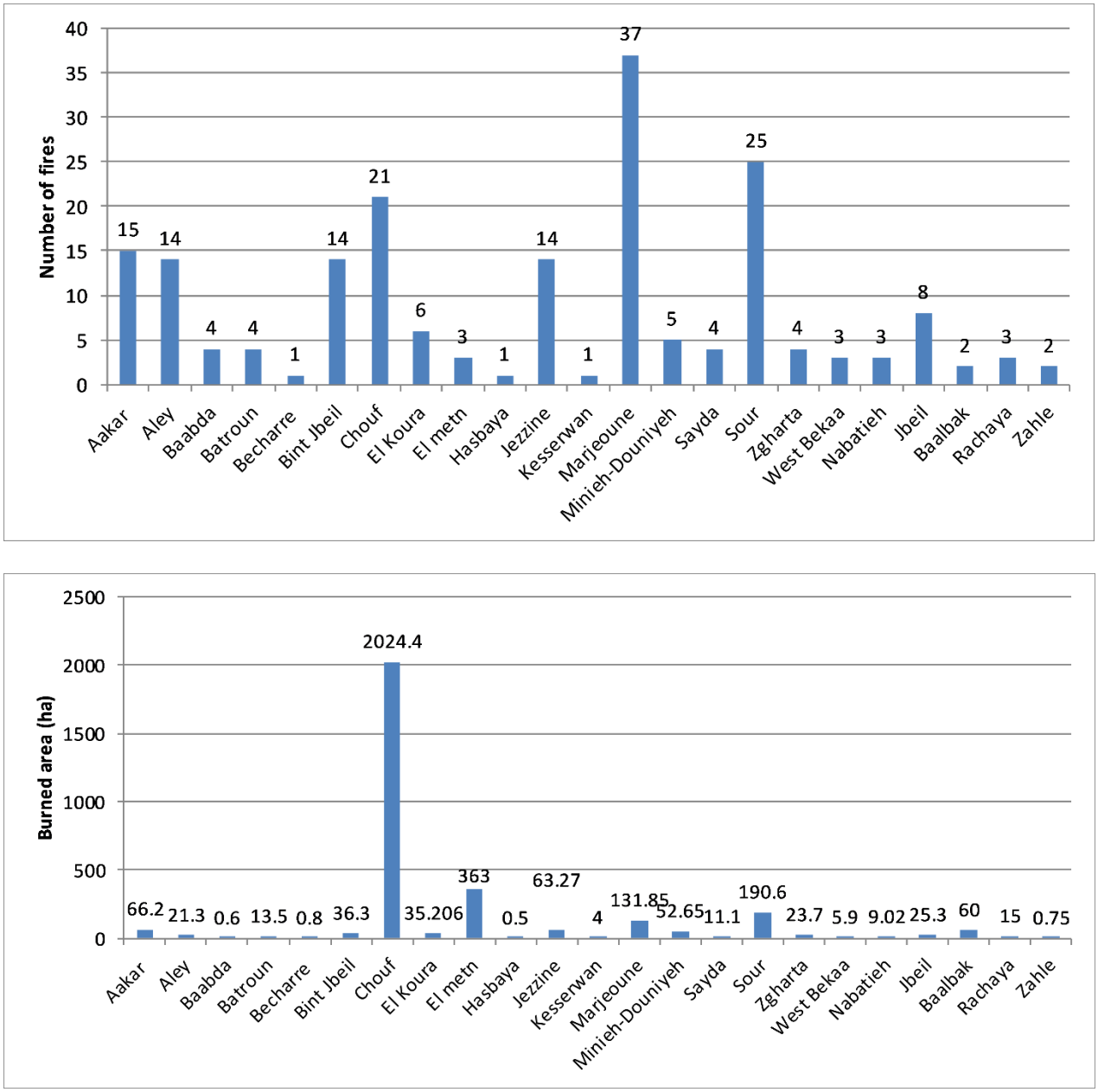


Figure 3. Distribution by Caza of fire occurrence (upper), and burned areas (lower)

Mountainous areas were affected by the largest extent of burned areas (77.82%), followed by valleys (17.08%) and plains (1.28%) consecutively. Mountains were also affected by the largest number of fires (58.76%), followed by valleys (23.2%) and plain areas (14.43%) consecutively (Figure 4).

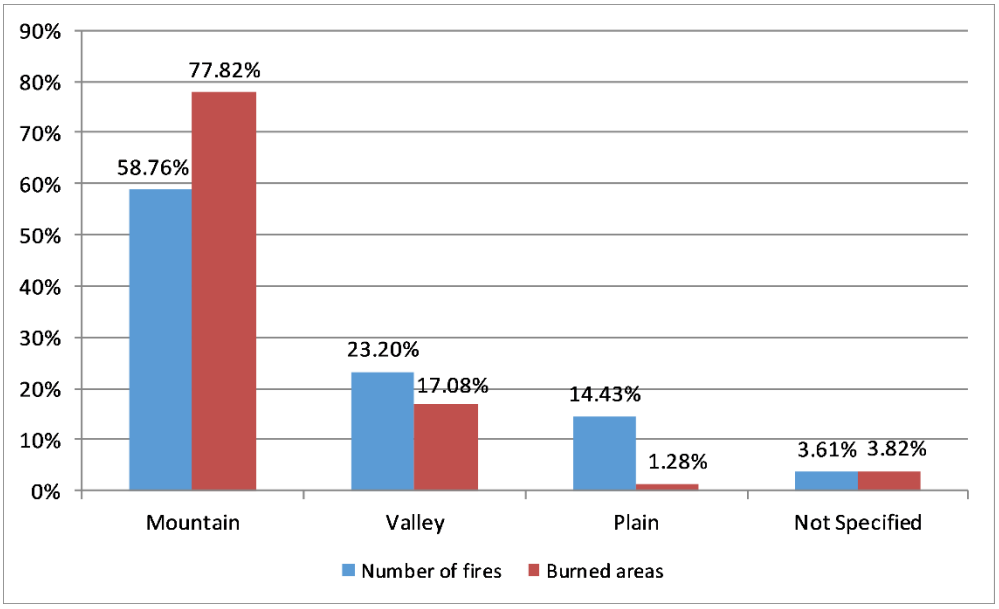


Figure 4. Land type affected by fires

A total of 74.71% of affected fuel types (Figure 5) was mixed agriculture-forests, followed by mixed forests (15.31%) and broadleaved forest (4.66%).

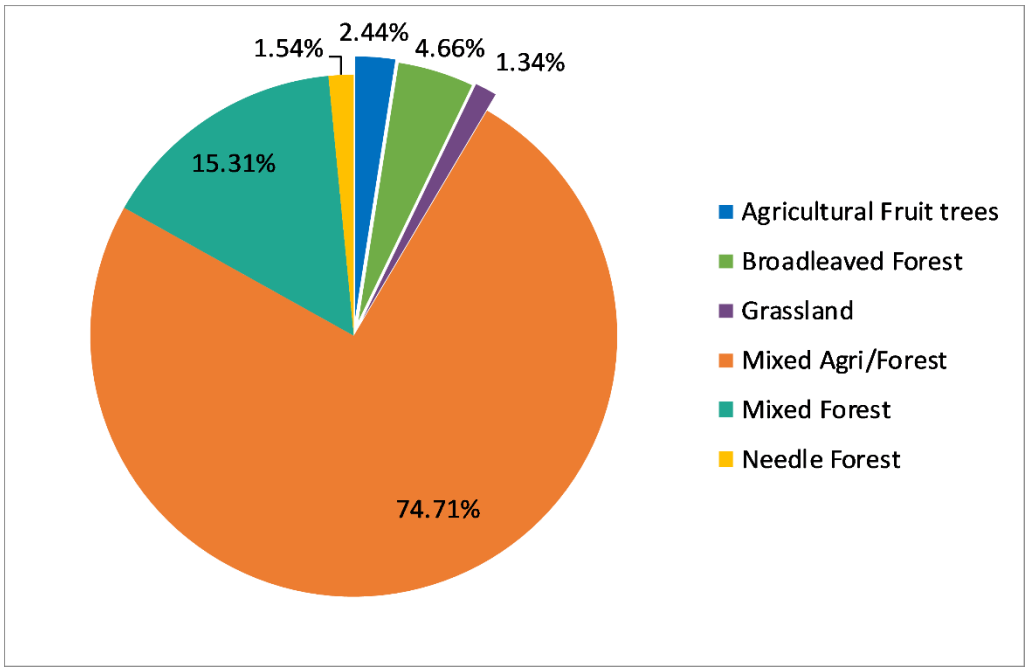


Figure 5. Distribution of fuel type affected by fires

4. CAUSES OF FIRES

Arson was found as the main cause of fires for 63% of the reported fire events. Furthermore, 9% of causes were attributed to activities in nature, 5% of causes were due to landfill, while 19% of fires had unknown causes (Figure 6).

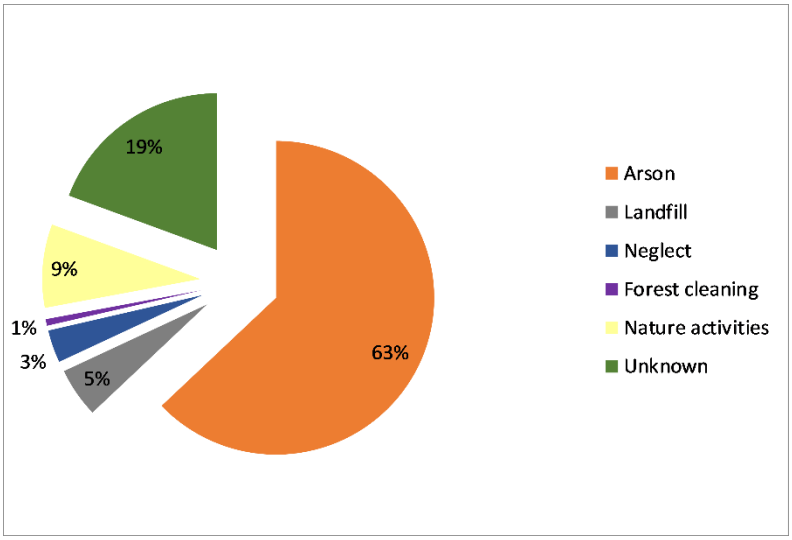


Figure 6. Distribution of main fire causes

5. FIRE FIGHTING MEANS

Reporting

Local residents reported 50% of fire incidents, while 29.90% of fire incidents were reported by Internal Security patrols, 4.63% by farmers, and 8.25% by others (Figure 7).

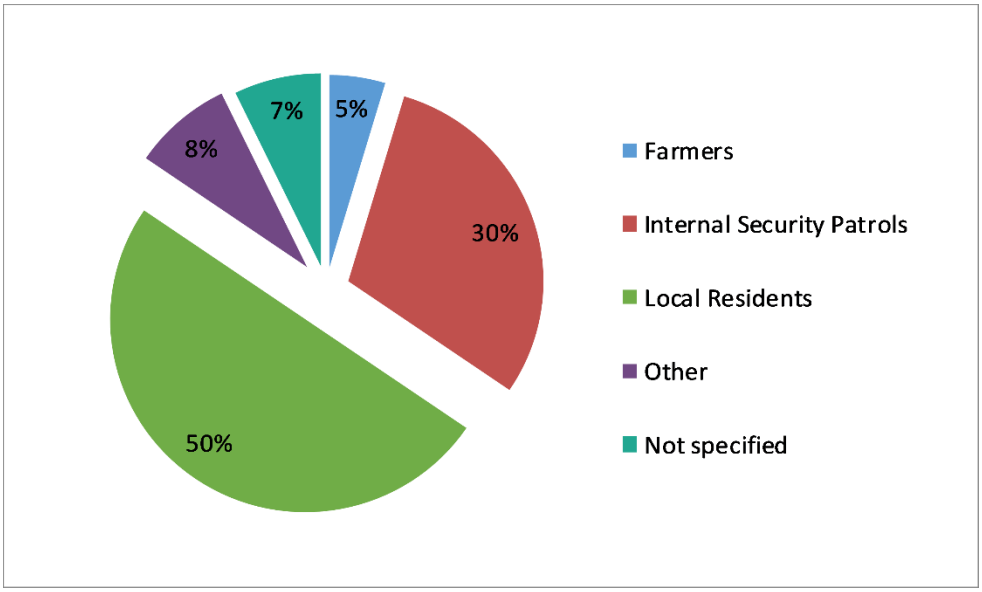


Figure 7. Fire reporting individuals/agencies

Fire starting time

Most of the fires started between noon and 4 pm (46.39%), and 18.56% of fires started between 8 am and noon. In addition, 12.37 % of fires started between 4 pm and 8 pm and 11.34% of fires started between 8 pm and midnight. The remaining 11.34% of fires started between 4 am and 8 am (Figure 8).

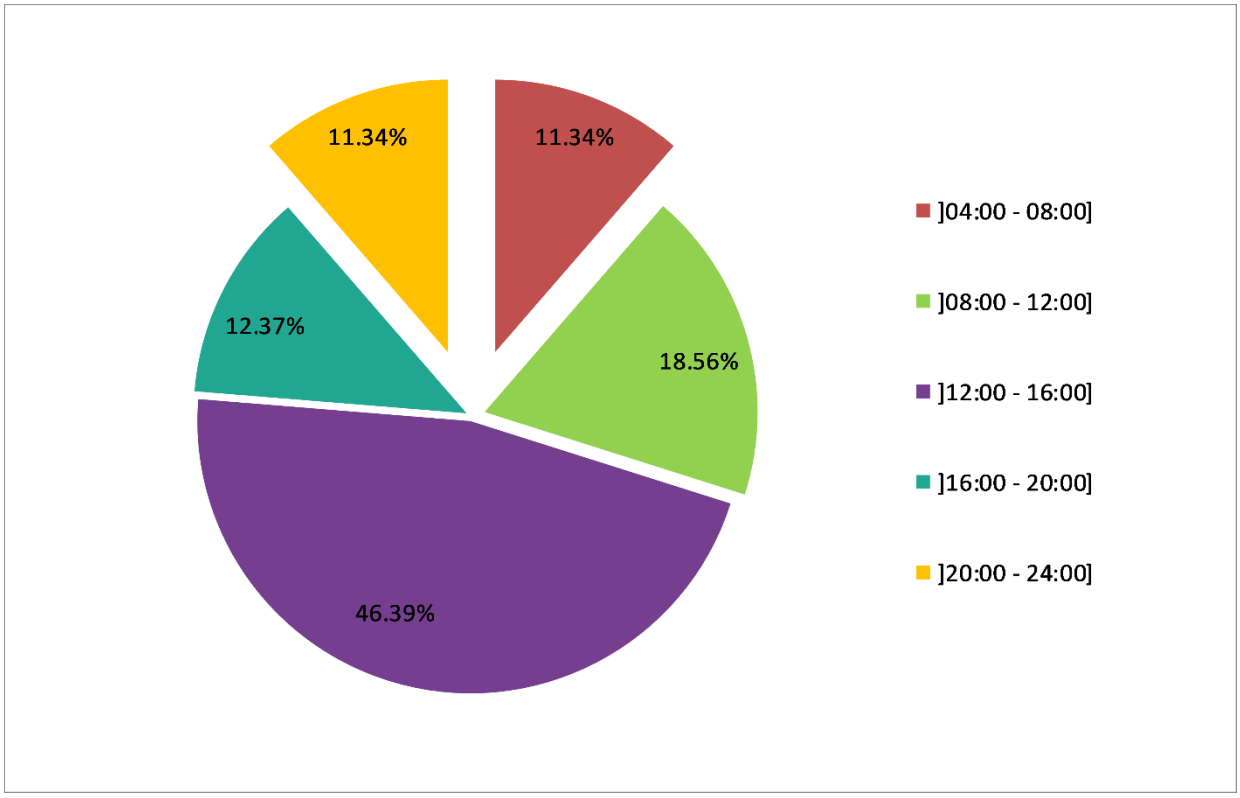


Figure 8. Temporal distribution of fire occurrence

Intervention time

It was observed that 53% of first interventions in fire suppressions occurred within the first 20 minutes after the reporting time, while 22% of interventions happened after 20 minutes and before 1 hour from the reporting time (Figure 9).

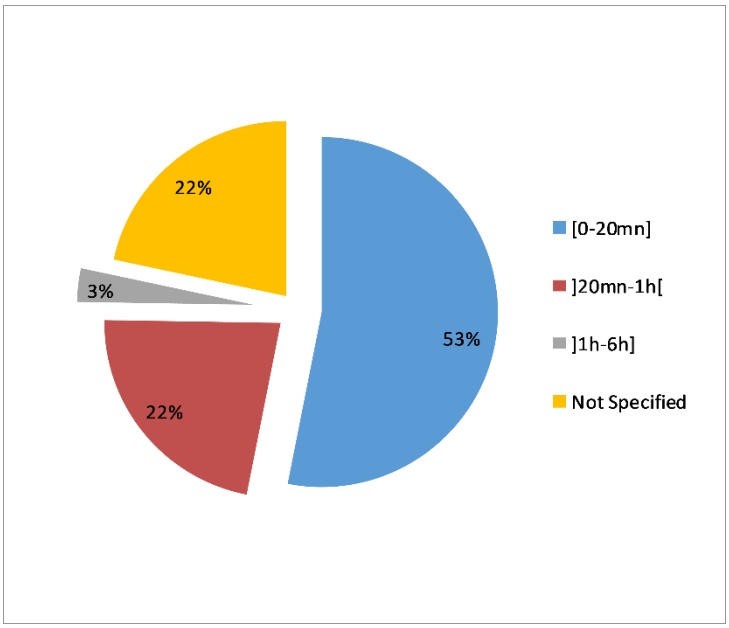


Figure 9. Times for intervention after reporting fires

Fire duration

The largest number of fires lasted between 1 and 2 hours (48%). A total of 26% of fires lasted between 2 and 5 hours, and 12% of fires lasted between 5 and 12 hours. It was also observed that 5% of fires lasted between 12 and 24 hours. However, only 2% of fires lasted more than 24 hours (Figure 10).

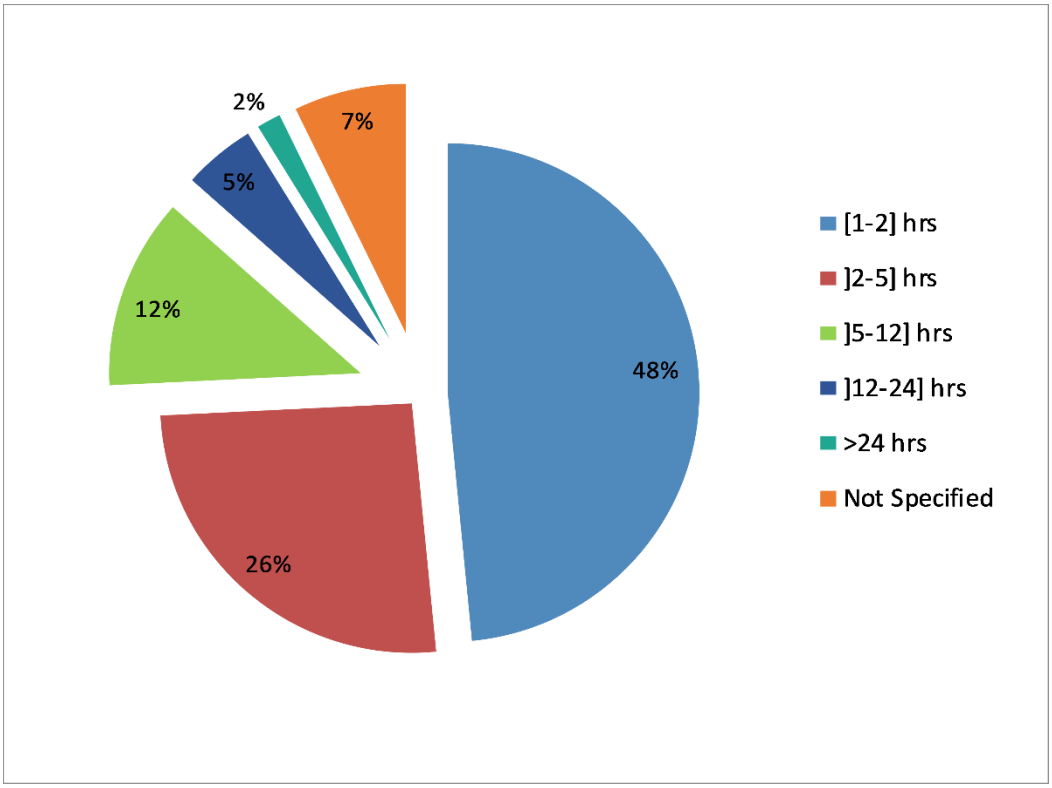


Figure 10. Fire duration

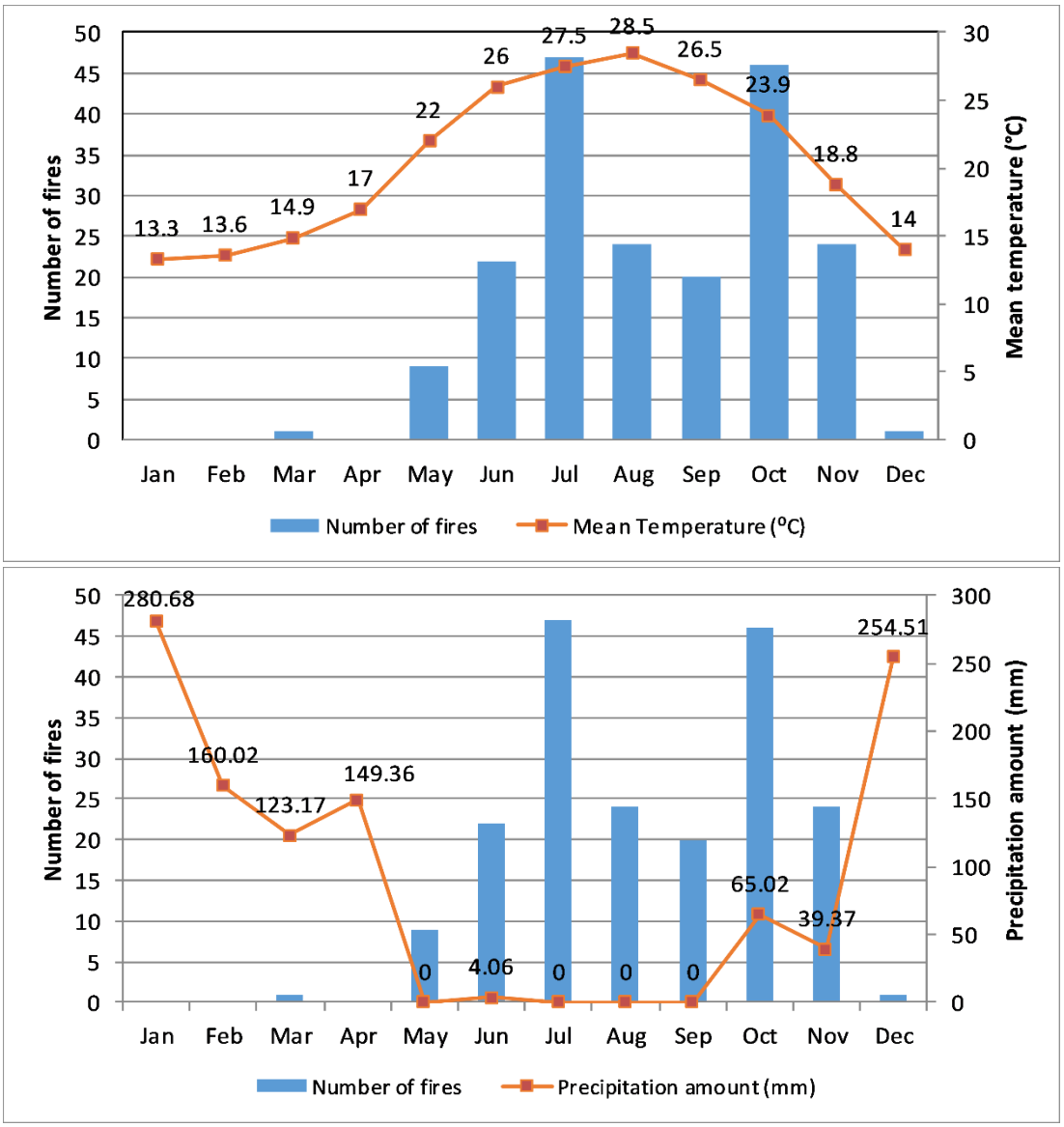
Resources employed in fire suppression

The following human and technical resources were involved in fire suppression:

	Nb. of Small Cars	Nb. of Water Tanks	Nb. of Other Cars	Nb. of Human Resources	Lebanese Army Helicopters (Nb. of times used)
Civil Defense	122	357	18	729	18
Army	46	6	13	471	
Internal Security	108	4	10	359	
Ministry of Agriculture	3	2	0	24	
NGO	27	22	5	145	
Local Resident	0	0	0	651	
Total	306	391	46	2379	

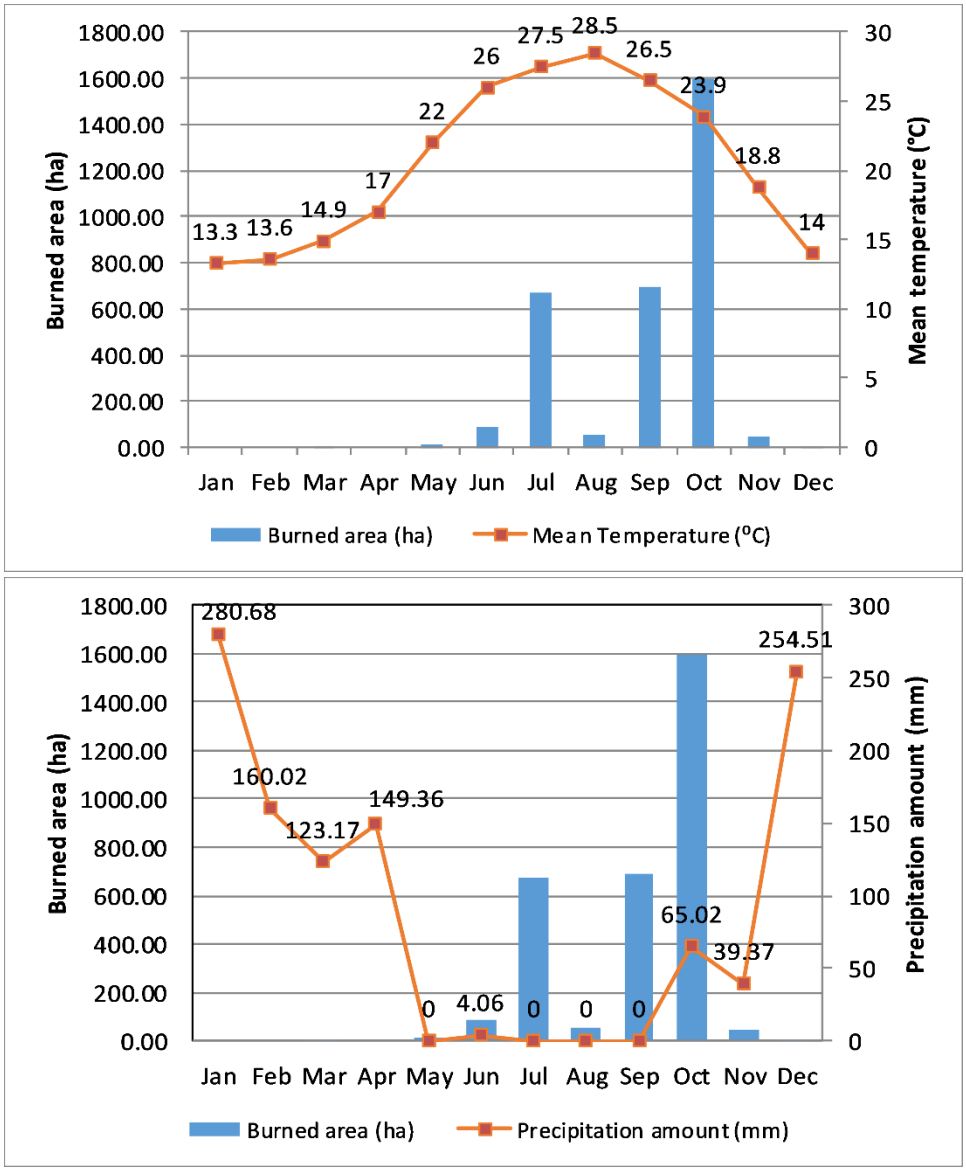
Table 1. Human and technical resources

6. FIRE SEASON OVERVIEW



Observations data are reported by the weather station 401030 (OLBA) – Latitude: 34.45 and Longitude: 35.8 at an altitude of 5 m above sea level. These observations are presented for display purposes only and not for use in correlation analysis. en.tutiempo.net/climate/ws-401030.html

Figure 11. Fire occurrence in function of monthly mean temperature (upper) and monthly precipitation in 2019 (lower)



Observations data are reported by the weather station 401030 (OLBA) – Latitude: 34.45 and Longitude: 35.8 at an altitude of 5 m above sea level. These observations are presented for display purposes only and not for use in correlation analysis. en.tutiempo.net/climate/ws-401030.html

Figure 12. Burned areas in function of monthly mean temperature (upper) and monthly precipitation in 2019 (lower)

7. WILDFIRE PATTERN IN LEBANON

In 2019, the recorded fire season (176 days) was 54 days shorter than the 2018 fire season. July was the peak month in number of fires for the year 2019 (Figure 13).

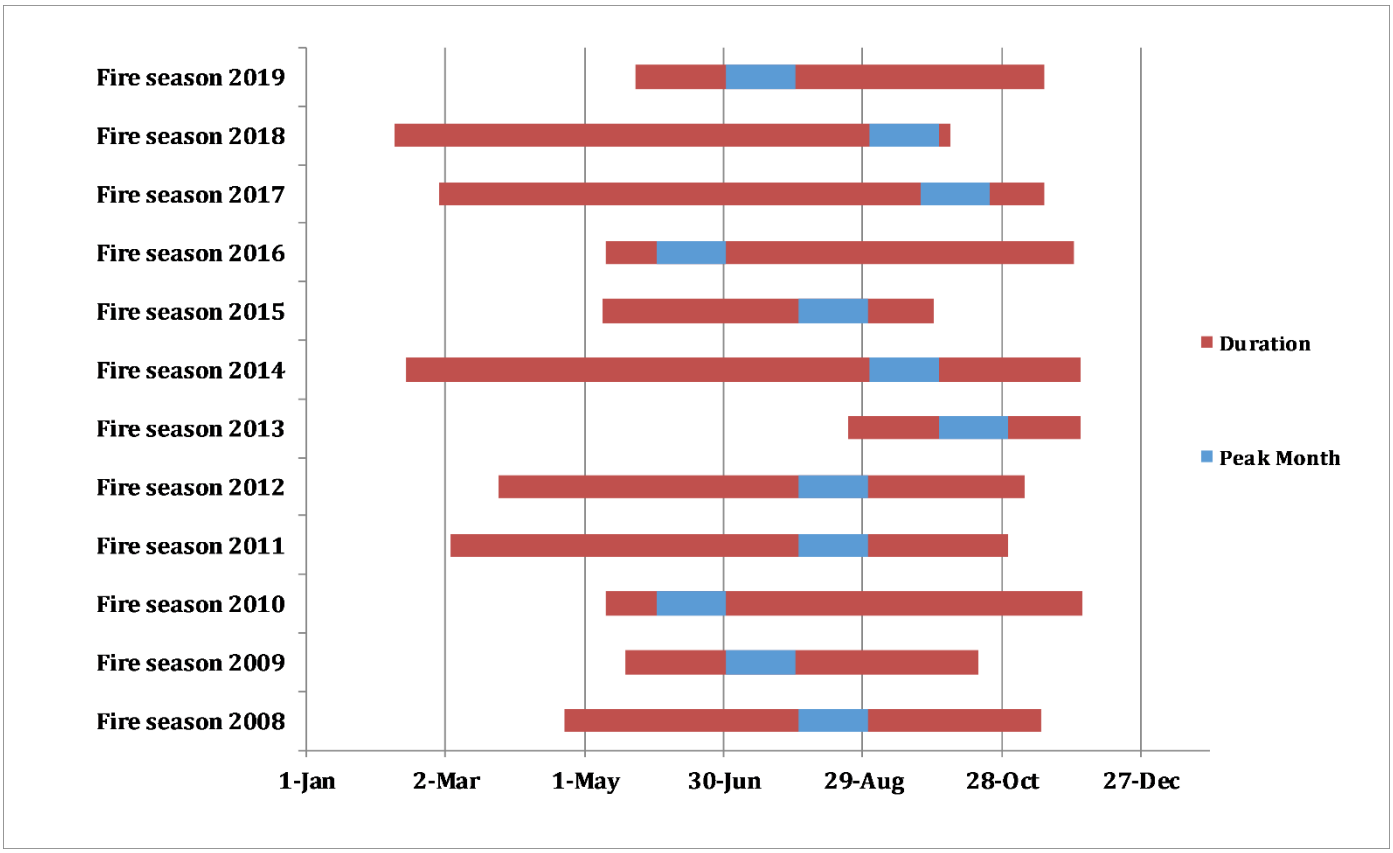


Figure 13. Comparison in fire inter-annual seasonality

A comparison of monthly fire occurrence and burned areas from 2008 to 2019 showed the following figures (Figure 14).

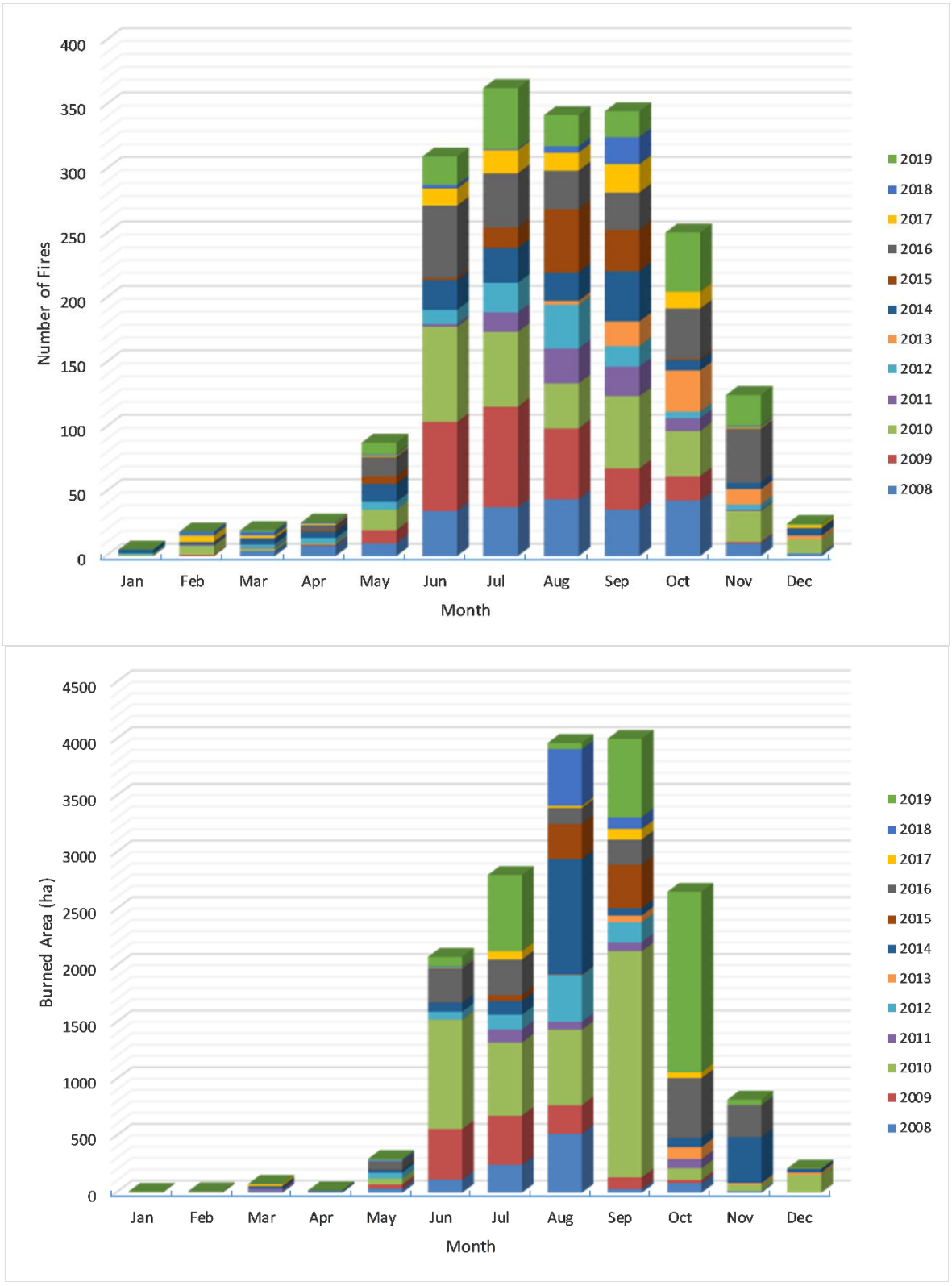
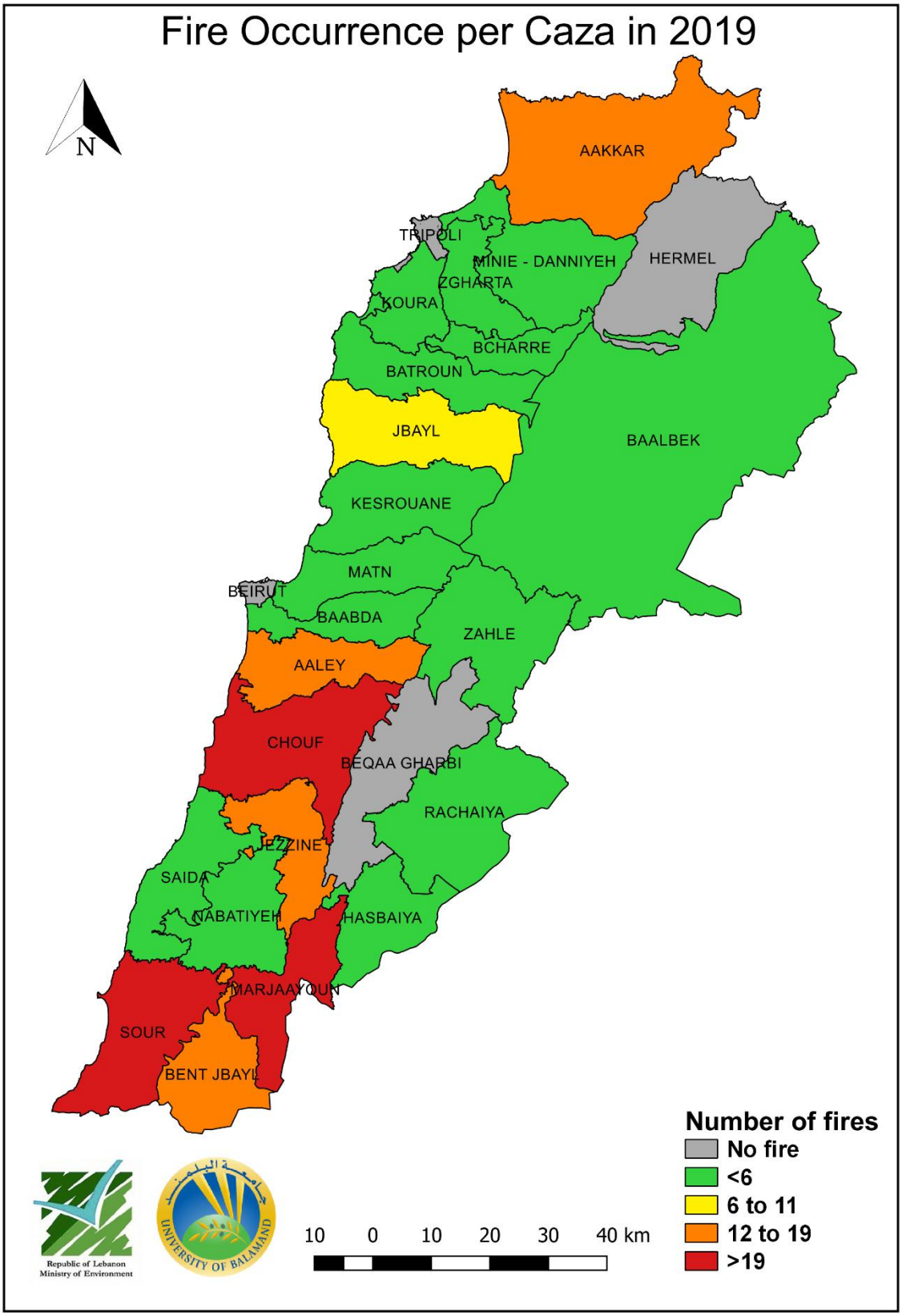
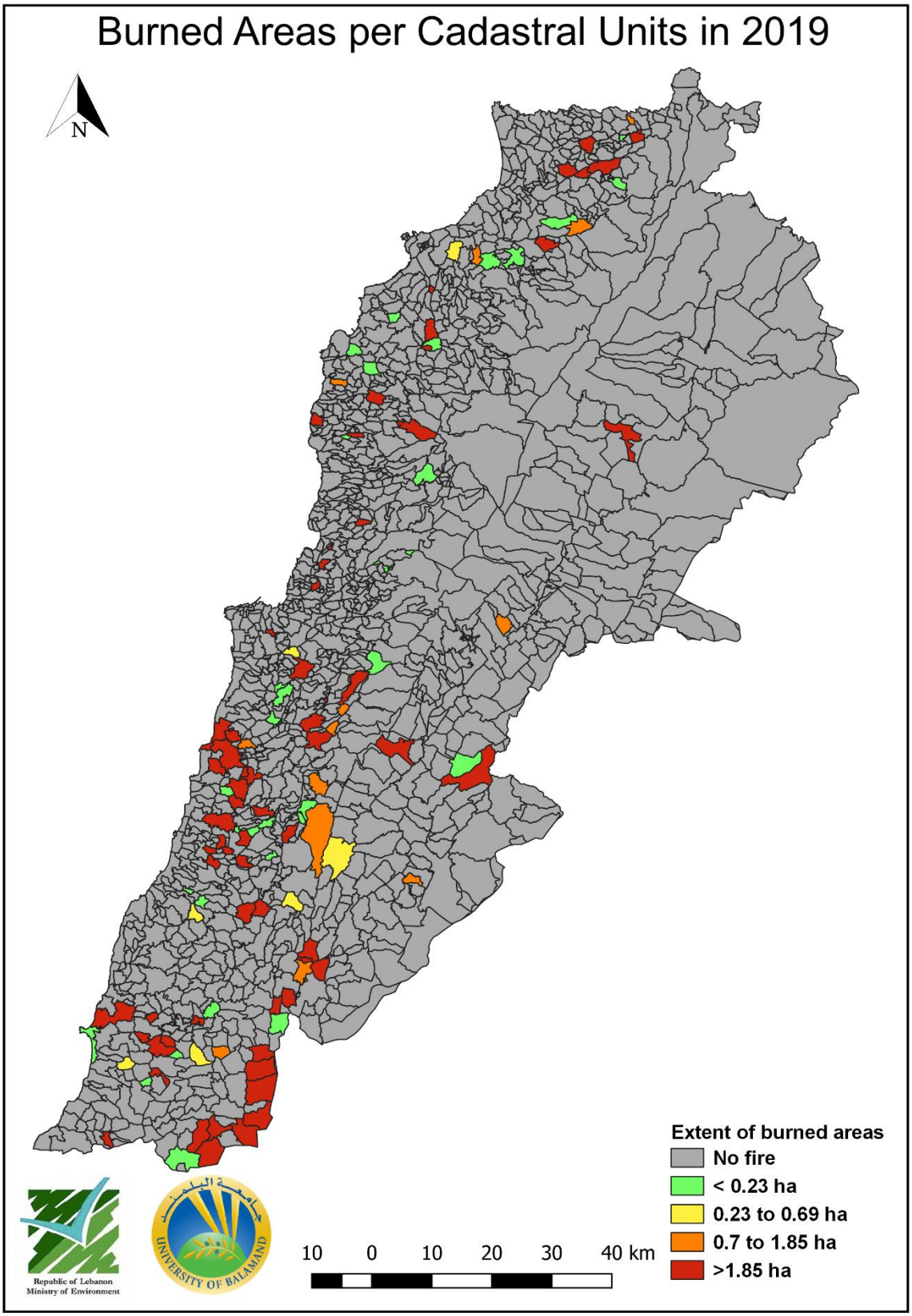


Figure 14. Comparison of fire occurrence (upper) and burned areas (lower) in the period between 2008 and 2019

Annex 1: Fire occurrence per Caza in 2019



Annex 2: Extent of burned areas per cadastral units in 2019



Contact Information:

Department of Ecosystems - Ministry of Environment:

Contact: Lara Samaha, Head of Department
Ministry of Environment
Beirut Central District, Lazarieh Center
P.O.Box 11-2727
Beirut - Lebanon
Tel: +961 (0)1 97 65 55
Fax: +961 (0)1 98 15 34
Website: www.moe.gov.lb

Land and Natural Resources Program – Institute of the Environment - University of Balamand:

Contact: George Mitri, Program Director
Institute of the Environment
University of Balamand
P.O.Box: 100, Tripoli - Lebanon
Tel: 00961-6-930250 ext. 3944
Fax: 00961-6-930 257
Websites:
www.balamand.edu.lb
home.balamand.edu.lb/wildfire
firelab.balamand.edu.lb/FireLabWeb/FireDanger