

DANCING FOR THE RAIN



REPUBLIC OF MACEDONIA
 Ministry of Interior
 UVR-OVR _____

(for open spaces)

STATISTICAL FORM FIRE F-2

No. _____

1. Location:

1.1. Municipality 1.2. Nearest Settlement

1.3. Nearest location 1.4. Code of Activity

1.5. Topographic Map (1:25000) Section Quadrant

1.6. User 1.7. Owner

2. Action Times:

	month	day	hour	min
2.1 Occurence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Detection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Time of Registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Time of Arrival	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Time of Localisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Time of Extinguishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. The Fire:

3.1 Discovered by: forest workers - 1, observer - 2, observer by air - 3, others - 4

3.2 Appeared near by: highway - 1, path - 2, private resident area - 3, touristic places - 4,
other places in the wood - 5, nearby or on agricultural land - 6, other - 7.

3.3 Does the fire repeat: once - 1, twice - 2, several times - 3.

3.4 Day of appearance: holidays - 1, weekend - 2, working day - 3.

3.5 Type of fire: underground - 1, surface - 2, high - 3, combined - 4.

4. Way of Appearance and Causes:

4.1 Natural: lighting - 1, auto-combustion - 2, other - 3.

4.2 Carelessness: fires on agricultural lands - 1, fires on pastures - 2, forest workers - 3,
open fire - 4, cigarette but - 5, dumps - 6.

4.3 Other causes: locomotives - 1, electrical wires - 2, motors and machines - 3, other - 4.

4.4 Intentional: - 1.

4.5 Unknown: - 1.

4.6 Causant: known - 1, unknown - 2.

5. Conditions of the Environment:

5.1 Meteorological data: Meteorological station _____

hour (LSV) number of days since last precipitation ..

maximal temperature °C relative humidity %

wind: velocity km/h direction

5.2 Orography: Eksposition Inclination

Altitude from to

5.3 Fuel Classes in the Burnt Area

grasses - 1, bushes - 2, forests - 3, slash - 4.

6. Engaged Personnel and Equipment:

6.1 Estringuishers (number of men):

Forest engineers and technicians

Forest workers organized in teams

Professional firefighters

Members of the amateurs fire associations

Civil Protection forces

Forces of the Ministry of Interior

Army forces

Civilians

Total

6.2 Veclihes

special number tractors number other number

jeeps trucks

6.3 Aircrafts:

Planes number # of charges hours Helicopters number # of charges hours

7. Used Tactic of Estringuishing:

7.1 Direct surrounding -1, frontal - 2, one of two using natural barriers - 3.

7.2 Indirect contrafire - 1, isolation of the burnt area - 2.

7.3 Retardants amonia - 1, foaming - 2

8. Structure of the Burnt Area:

8.1 Forests:

8.1.1 Purpose of the forest (1-10)

8.1.2 Phytocenological type

8.1.3 Name of the forest unit

section

subsection

danger degree

8.1.4 Type of forest (1-5)

burned area (ha)

		1		2		3	
		state	private	state	private	state	private
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31 - 60 g.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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degradated	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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damaged wood pulp (m ³)							
		1		2		3	
		state	private	state	private	state	private
< 30 g.	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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8.2. Agricultural Lands

	State		Private		Other	
	area	quantity	area	quantity	area	quantity
gardens (1-14)	□□	□□□□	□□□□	□□□□	□□□□	□□□□
grain fields (1-11)	□□	□□□□	□□□□	□□□□	□□□□	□□□□
industrial (1-16)	□□	□□□□	□□□□	□□□□	□□□□	□□□□
furazni (1-10)	□□	□□□□	□□□□	□□□□	□□□□	□□□□
vineyards (1-2)	□	□□□□	□□□□	□□□□	□□□□	□□□□
orchards (1-15)	□□	□□□□	□□□□	□□□□	□□□□	□□□□
pastures - □		□□□□	□□□□	□□□□	□□□□	□□□□
stubble fields		□□□□	□□□□	□□□□	□□□□	□□□□
total		□□□□	□□□□	□□□□	□□□□	□□□□

9. Losses:

9.1 Casualties	dead	□□	injured	□□
9.2 Vehicles	destroyed	□□	damaged	□□
9.3 Direct material damage				

	Area (ha)		Losses (x1.000 den)
	State	Private	
Forests	□□□□□□	□□□□□□	□□□□□□
Agricultural land	□□□□□□	□□□□□□	□□□□□□
Dumps	□□□□□□	□□□□□□	□□□□□□
Other	□□□□□□	□□□□□□	□□□□□□
Total	□□□□□□	□□□□□□	□□□□□□

Date

Commander of firefighters

P.S.

Inspector

Milutinovic, Z., and T. Todorcevski. 2001. Manual for defining the way and procedure for determination of fire behavior fuel models. Report IZIIS 2001-40/1, Skopje, November 2001.

An intermediate result of this project:

A daily fire danger rating system was created including a procedure for determination of fuel models for estimating a fire behaviour and some behavioural characteristics of fires in different environmental conditions.

The achievements has been summarized in terms of adequate legislation "Regulations for Special Measures of Protection of Forests Against Forest Fires" and enforced ([Official Gazette of RM No. 69/2001](#)).

Concluding Remarks - 2001

- Over the last decade (1989-2000) **10,166** forest and range fires occurred with a total burnt area of **118,235** ha.
- About 31% of the total number of fires occurred in forests and forestlands with a burnt area ranging about 71% of the total burnt area.
- The largest burnt area per fire is associated to forest fires.
- The cause of ignition is dominantly negligence and arson. For substantial number of fires the cause is unknown.

Concluding Remarks/2- 2001

- The number of fires occurred in the year of 2000 and corresponding burnt area, as well, show a maximum that is ever recorded.
- Firefighting capacity of the country is partly sufficient to cope with the fires in flat and agricultural lands, but insufficient for hardly accessible mountain and forest terrains.
- The Country does not have a unique and uniform methodology for fire damage inventory, data acquisition and loss estimation.

Concluding Remarks/3-2001

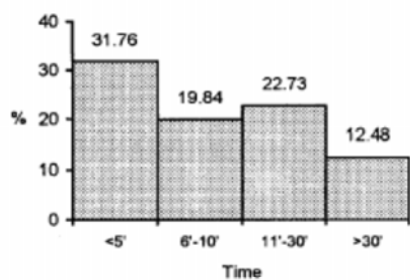
- The content of forms used by different agencies (Statistical Bureau, Ministry of Forestry and Agriculture and Ministry of Interior) for data collection and loss estimation differs, providing sometimes misleading and unreliable estimates.
- There is a strong need for enforcing a unique national procedure and system for collection and processing of data on forest and range fires.
- The intermediate results from above mentioned projects, particularly the fuel models developed, should be incorporated in adequate up-to-date fire prediction and behaviour systems.

Year 2000-2004: CAUSE

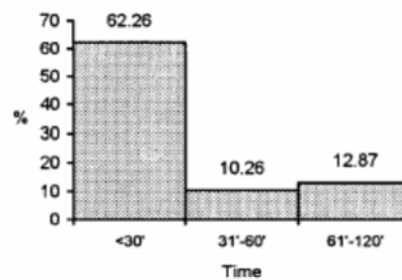
Година Year	Намера/ Arson	Невнимание/ Negligence	Природни/ Natural	Неутврдено/ Not identified
2000	444	3,921	74	1,441
2001	591	3,586	52	1,202
2002	297	2,024	46	480
2003	351	2,958	81	822
2004	272	2,884	40	863
Вкупно Total	1955	15,373	293	4,808
%	8.7	68.5	1.3	21.4

Year 2000-2004: FIRE NUMBER AND PATTERNS

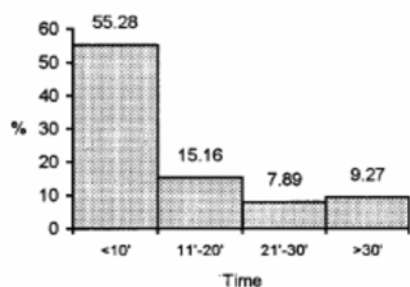
Година Year	Вкупно Total	Објекти/ Facilities	Возила/ Vehicles	Отворен Простор/ Range&Forest Fires		Штета/ Loss			Загинати/ Mortality	Повредени/ Injury
				Број/ No.	Опж. Повр./	Мил. МКД/ Mil. MKD	Курс/Rate (\$/МКД)	Мил. \$/ Mil \$		
2000	5,958	1,386	237	3,818	53.378	1,949	65.33	29.83	9	59
2001	5,431	1,774	264	3,395	18.282	916	69.17	13.24	7	18
2002	2,940	1,469	305	1,178	2.086	165	58.60	2.81	7	20
2003	4,276	1,563	356	2,357	5.548	155	49.05	3.16	11	34
2004	4,059	1,472	282	2,158	6.228	233	45.07	5.17	8	31
Вкупно Total	22,664	7,664	1,444	12,906	85.522	3,418		54.22	42	162
%	100	33,8	6.3	56.9						



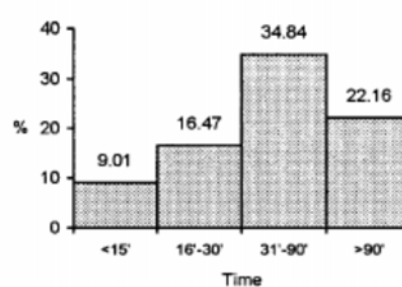
a) alarm



c) arrival to localization time



b) alarm to arrival time



d) arrival to extinguishing time

Fig 3.17 Response Time, from Alarm to Extinguishment of Fire
/Source: Ministry of Internal Affairs/

Table A.1 Quantitative Participation of Fire Material

Fire material	Fraction	T/ha
oak (<i>Quercus coccifera</i> L.) height up to 0.6 m	oak	32
oak (<i>Quercus coccifera</i> L.) height up to 1.3 m	grass	2
	dry branches	13
	oak	31
	<i>Total</i>	46
oak (<i>Quercus coccifera</i> L.) height over 1.3 m	oak	89
Average:	all fractions	55.8

Table A.2 Velocity and Temperature of Burning of Oak (*Quercus coccifera* L.)

Fraction	Velocity of heating m ² /min	Temperature of heating (°C)
leafs mass	4 min 0.6 sec	800
branches/timber	7 min 0.3 sec	960

First day, July 17, 1988

The fire was reported to the Fire Fighting Unit in Valandovo at 15h 17'. At 16:00 h, 11 fireguards with 2 cisterns, 2 tractors - atomizers, 15 water sprayers as well as approximately 200 inhabitants of the village of Grchiste equipped with shovels, spades, hoes and hatchets arrived at the place of the fire which was approaching the village of Grchiste.. The fire at this spot was localized by 20:00 h. Unfortunately, while the fire-fighters protected the village and the nearby vineyards, the fire ravaged freely toward north-northeast. During this operation, 11 villagers were slightly injured. During the first day, the fire affected 305 ha (Fig. A.1) of land.

Fifth day, July 21, 1988

In the early morning hours (Figs. A.4 and A.5), aided by the strong north wind, the fire endangered the town of Bogdanci (about 7000 inhabitants). To eliminate the danger, a fire protection barrier was placed within a width of 50 to 100 meters using the whole available equipment and machinery. These measures prevented the fire to advance further.

Later that evening, the weather changed, the north wind that added to the spreading of the fire stopped and a south wind started to blow enabling the fire-fighters to come closer to the fire front and achieve better results. During the fifth day, the fire affected an area of 545 ha.

The fire let up in its intensity but the experience from the preceding days made the fire-fighters check all the live coals over the whole fire-affected area.

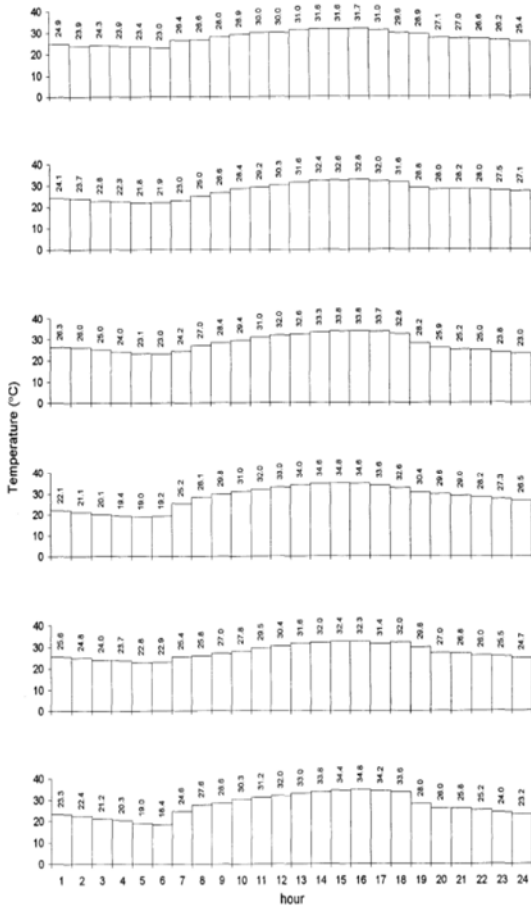


Fig. A.2 Temperature in the Region Valandovo - Gevgelija in the Period 17-22.07.1988

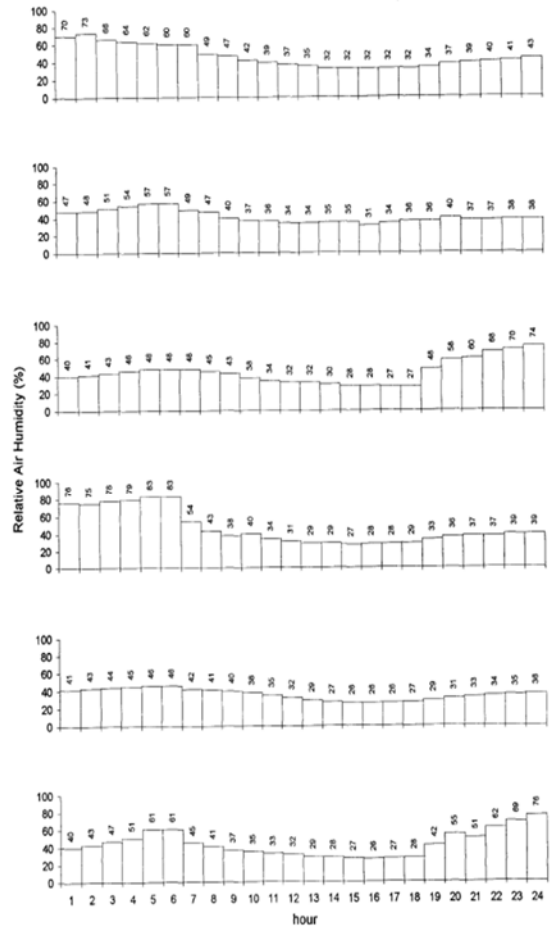


Fig. A.3 Relative Air Humidity in the Region Valandovo - Gevgelija in the Period 17-22.07.1994

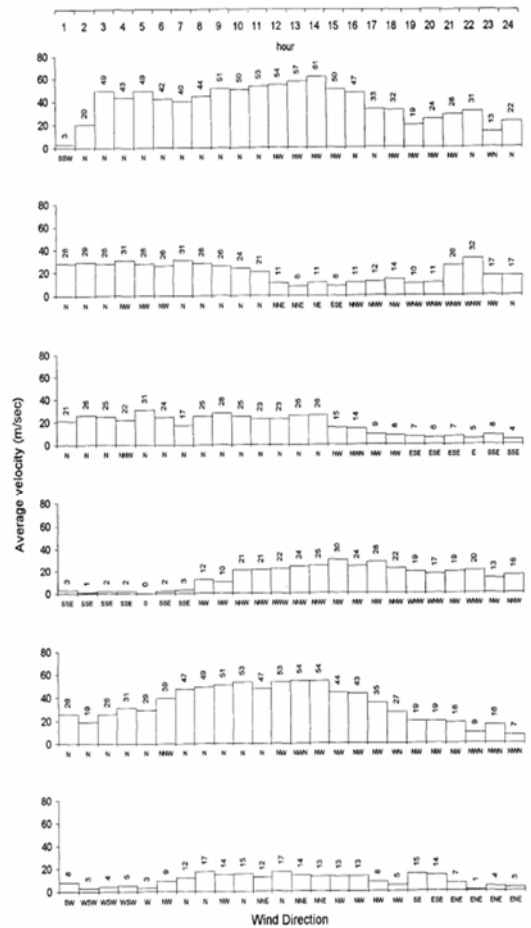


Fig. A.4 Average Velocity and Direction of Wind in the Region Valandovo - Gevgelija in the Period 17-22.07.1988

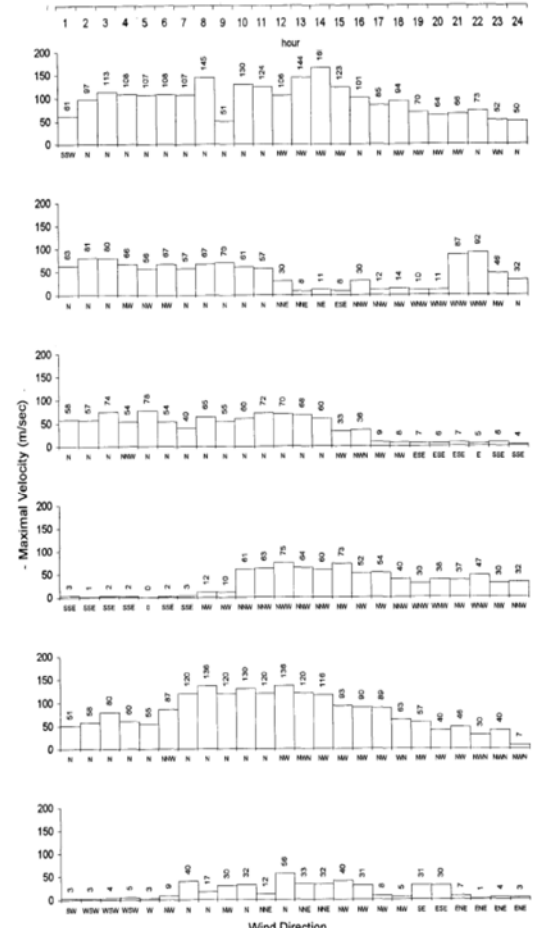


Fig. A.5 Maximal Velocity and Wind Direction in the region Valandovo - Gevgelija in the period 17-22.07.1988

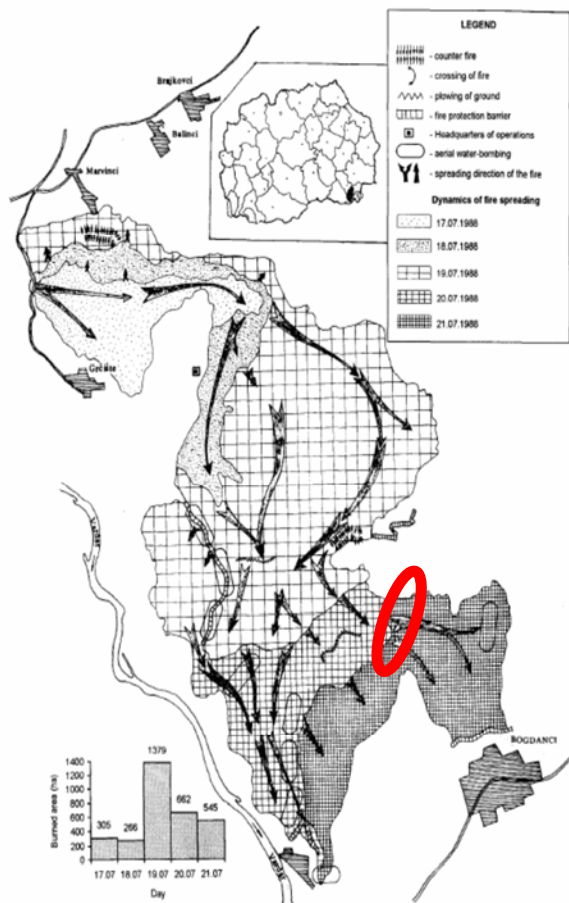


Fig. A.1 Dynamics and Characteristics of "Pogana" Wild Fire

Table A.4 Equipment Engaged in Fire Localization and Extinguishing

Equipment	Quantity
Fire cars	27
Special vehicles	1
Water tanks	4
Other vehicles	11
Tractors - sprinklers	32
Tractors	16
Airplanes "Canader - CL-125"	2
Helicopter	1

Table A.3 Dynamics of Engagement of People

Date	Firemen	Civilians	Army	Total
17/18.07	10	682		692
19.07	10+28	750	200	988
20.07	28	2350	280+250	2908
21.07	28	1450	280	1758
22.07	28	650	280+200	1158

- The delayed reporting of fire occurrence to the competent authorities enabled that it be largely spread and aggravated its localization and extinguishment;
- The improper assessment of the state of the terrain and the application of improper methods and forces for localization and extinguishment also influenced the quick spreading of the fire.
- During most of the time, there was almost none horizontal and vertical communication among the participants in the fire extinguishment which resulted in disorganization and incoordination in taking initiatives almost along the whole fire front;
- The fire extinguishment by using planes did not yield the expected results partially due to the conditions on the terrain (position, bad weather conditions, dense smoke) and partially because of non synchronized action of the teams on the terrain;
- The use of tractors-atomizers in localization and extinguishment of the fire proved worthwhile particularly because of their easy handling and usage of water in several ways.

