

MANAGEMENT COORDINATION OF INTERVENTIONS IN CASE OF WILDFIRES

Abstract

The introductory part of the article summarizes the characteristics of the Žilina region and analyses it statistically in terms of the issue of fires in the natural environment. Other sections and chapters discuss the equipment of professional firefighting units and also volunteers units used for defeating nature fire and especially forest fires. The last part deals with the issue of coordination of the participating units, and points out some problems of operational management of intervention.

Key words: nature fire, forest fire, volunteer, fire department equipment, management of intervention

BEVATKOZÁSOK IRÁNYÍTÁSA ERD TŰZEK SORÁN

Absztrakt

A cikk bemutatja a szlovákiai Zsolna régió t zvédelmi jellemz it és statisztikai elemzést végez a vegetációtüzek vonatkozásában. A szerz k ismertetik a hivatásos t zoltó egységek által használt felszereléseket, a terület természeti tüzeinek jellemz it, valamint az erd tüzek felszámolásában résztvev önkéntes egységek képességeit is. A cikk ezen felül foglalkozik a beavatkozó egységek munkájának összehangolásával, rámutatva a beavatkozások irányítását érint problémák egy részére is. A kutatás eredményeként a vegetációtüzek vonatkozásában nemzetközi tapasztalatok szerezhetünk, következtetéseket tudunk levonni mind az erd tüzek oltásával, mind pedig az önkéntes mozgalom hatékonyságával kapcsolatban.

Kulcsszavak: természeti t z, erd t z, önkéntes, t zoltó felszerelések, beavatkozás irányítása

1. INTRODUCTION

Every fire means undesirable event and a threat. Nature fire and especially forest fire has its own specifics that are different from other types of fires. The difficult terrain, an increased demand for the deployment of forces and resources, the need to use the special fire-fighting equipment, forest or agricultural machinery, the need for cooperation with municipal officials and volunteer fire departments, cooperation with landowners and other entities. All this raises the demands to intervention commander and his decision-making processes and affects the way of firefighting.

The management of the intervention is more challenging, when there are difficult conditions on the fire ground. The following article is concerned with the issue of operational management. It points out that the success of firefighting tactics depends on knowledge of firefighting equipment and proper coordination of individual units, as well as personal qualities of intervention commander.

2. STATISTICS OF INTERVENTIONS AND THE OCURRENCE OF FIRES IN ŽILINA REGION

Figure 1 show quantity of dispatches of firefighters to fires and the number of dispatches to wildfires in the period 2000 to 2015. These statistics shows that the fires in the natural environment represent around 30% of all interventions.

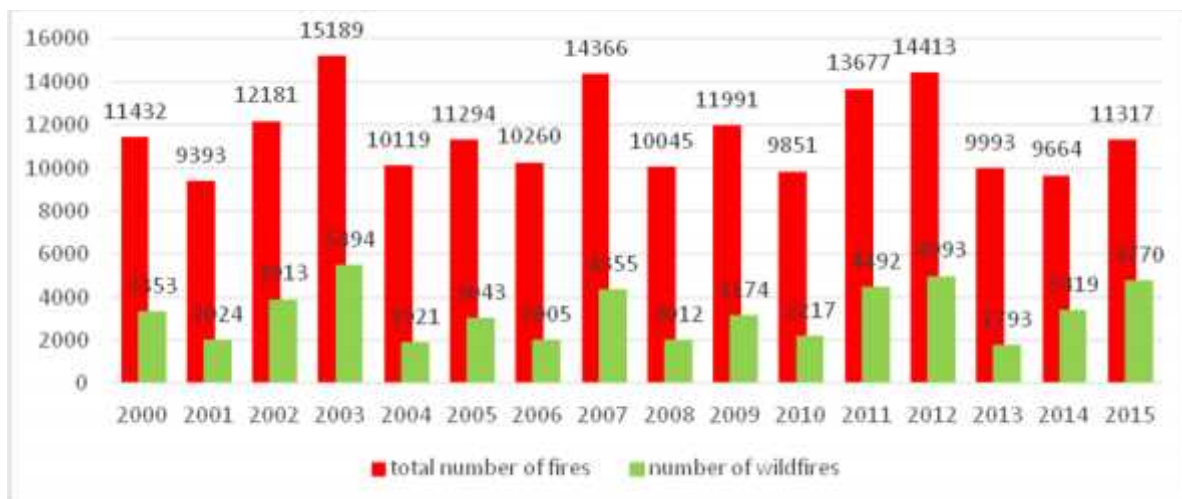


Figure 1: Quantity of dispatches to fires and wildfires in years 2000-2015 (Kozi ová)

The occurrence of fires in the natural environment is significantly impacts of climate factors, especially prolonged hot and dry weather. These interventions are usually accompanied by major property damage and threats to human health and life. Areas affected by fire and ecotypes regenerate decades.

The region of Žilina is located in the north western part of Slovakia. With the area of 6 808 km² it occupies 13,9 % of the territory of the state and it is the third largest region of Slovak Republic. The territory of the Žilina region is characterized by a diversity of landscape structures. From the fluvial plains of rivers, through agricultural land and forrests to alpine landscape of mountain ridges of Western Tatras, Low Tatras, Cho Mountains, Great Fatra, Small Fatra, Javorníky and Strážov Mountains. It is predominantly a mountainous landscape with low portion of arable land, with an attractive natural environment.



Figure 2: Seats of fire stations of HaZZ in Žilina region Source [1]

The Fire and Rescue Services (HaZZ) in Žilina region is comprised of 7 district directorates, which are further divided into 15 fire stations. The seats of fire stations and their distribution in respective districts is shown in figure 2.

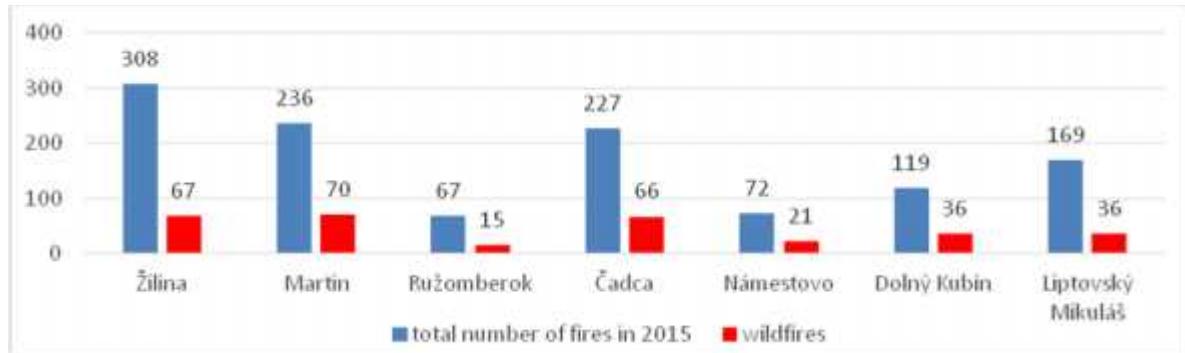


Figure 3: Quantity of dispatches to fires and wildfires in the year 2015 (Kozi ová)

In the year 2015 the highest number of dispatches to wildfires was recorded in the district directorate of HaZZ in Žilina, more precisely 86, the lowest number was recorded in district directorate of HaZZ in Ružomberok, with only 21 dispatches. However, it is important to remark that district directorate of HaZZ in Žilina has the largest territorial scope, whereas district directorate of HaZZ in Ružomberok has the smallest territorial scope.

Forces and means on fire stations are distributed according to the classifications of fire stations into types of I-V. Each type has a set of activities that the fire station is able to perform independently. Different types of stations have been determined with regards to the number of inhabitants, number of dispatches in previous time period and the presence of industrial, historical or some other objects of importance. This type of determination does not directly reflect the area of the district nor its geological characteristics. In terms of district-wide deployment of fire units in districts with larger geographic area, in more distant locations that are less readily available for professional fire units we should rely on volunteer fire units which should cover such areas. The classification of a fire is very important in every country. According to Bodnár we can find wide wildfires with high costs from the past in Hungary due a bad classification. [2]

3. TECHNICAL EQUIPMENT OF HAZZ FOR INTERVENTIONS IN NATURAL ENVIRONMENT

The Fire and Rescue Service is mainly equipped with fire engines, small firefighting apparatuses and special firefighting apparatuses suitable for interventions during wildfires. An overview of this equipment split by individual districts is shown in chart 1.

Chart 1: Firefighting equipment suitable for wildfires by Operations Center of Regional Directorate of Fire and Rescue Service in Žilina. Source: [1]

Vehicle / DD HaZZ	ZA	MT	RK	CA	NO	DK	LM
Fire Engine T815-7 6x6	4	2	1	4	2	3	3
MB Unimog 4x4	-	1	-	-	-	-	-
Praga V3S 6x6	1	-	-	1	-	1	1
Nissan Navara 4x4	2	1	-	1	1	1	-
Polaris 4x4	2	-	2	5	-	3	4
Other	-	-	-	2	-	-	-

Firefighting equipment suitable for fighting wildfires:

- Fire engine TATRA 815-7 6x6 – high-volume tanker useful for shuttle transport of water to wildfires and for transporting water into difficult terrain. Tank contains up to 9000 l of water, 540 l of foam, pump capacity is 3000 l/min.
- MB Unimog 1550 L 4x4 – modern fire engine useful for fighting wildfires. Water tank contains up to 2500 l of water, 200 l of foam, pump capacity is 2000 l/min.
- Praga V3S 6x6 – fire engine useful for interventions in difficult-to-access terrain. The downside of the vehicle is its obsolescence, low speed and low levels of safety during use. Tank contains up to 2500 l of water, pump capacity is 1600 l/min.
- Small firefighting apparatuses Nissan Navara and Land Rover – they serve for transporting firefighters and firefighting tools to difficult-to-access terrain.
- Polaris 4x4 - serve for transporting firefighters and firefighting tools to difficult-to-access terrain. They are equipped with tank that contains up to 200 l of water and with high pressure pump.

- Other – 8-wheel drive all-terrain vehicle Scottrac, Polaris quad – they serve for transporting firefighters and firefighting tools to difficult-to-access terrain. [3]

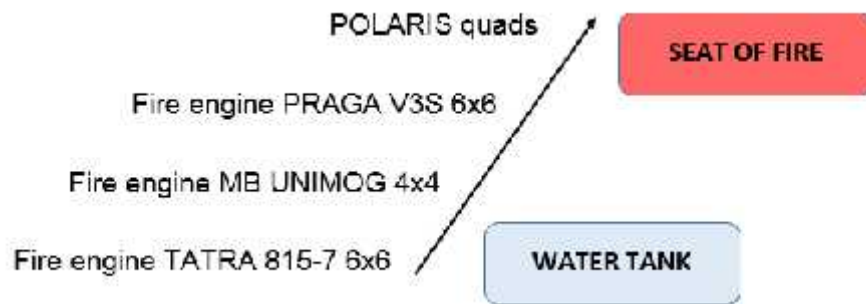


Figure 4: Chart of terrain accessibility of firefighting apparatuses in HaZZ SR. Source: [1]

According to the chart shown in figure 6 we can observe the different accessibility of the firefighting vehicles in difficult terrain. Fire engines Praga V3S are used only in some exceptional cases during the long-lasting interventions, due to their obsolence. Fire engines MB Unimog are suitable for fighting wildfires, although nowadays there is only one such vehicle in Žilina region, on fire station in Martin.

Current conception of transporting water to forest fire consists of:

1. Transport of water to the vicinity of forest fire in accordance with the accessibility of the terrain in high capacity fire engines TATRA 815-7 6x6 and subsequent filling of tanks of smaller firefighting apparatuses with better terrain accessibility. These vehicles can be also used for shuttle transport of water.
2. Transport of water on actual site of fire and fighting the fire using Polaris quads 4x4. These are filled from high capacity fire engine TATRA 815-7 6x6. By simultaneously operating 2 Polaris quads it is possible to repeat this firefighting cycle of filling and extinguishing 22 times. [4]

For supporting effectively the ground teams with aerial reconnaissance some drones were also purchased like in Hungary happened earlier. [5]

4. COORDINATIONS OF VOLUNTEER FIRE DEPARTEMENTS AND OTHERS INVOLVED SUBJECTS

Nationwide coverage with fire units is a system of organization of fire units implemented by forces and means that are evenly distributed. It specifies the base level of guaranteed help provided by intervention of fire units depending on level and category of hazards of given territory, it determines the application of fire units and sets out the principles of their cooperation in order to save people and property from fire, natural disasters and other extraordinary events. [6]

Nationwide coverage with fire units means a need to cooperate and coordinate different intervention units on the site of intervention. In region of Žilina, there are some critical locations because of high arrival times (Chart).

Chart 2: Some locations with critical coverage by firefighting units.

City	Intervention circuit	Time of arrival
i many	Rajec	21 min
Vrícko	Martin	27 min
LiptovskéRevúce	Ružomberok	22 min
OravskáLesná	Námestovo	27 min
NováBystrica	adca	25 min

These critical locations should be covered by volunteer units of communities. Volunteer units are divided into categories according to their forces and means.

Volunteer firefighters units are divided into categories:

- Category A – small fire engine, rescue vehicle and fire engine. Intervention unit at least 1+3, dispatch in 10 min, total of 16+1 members.
- Category B – small fire engine, rescue vehicle, Intervention unit at least 1+3, dispatch in 2 hours, total of 8+1 members.
- Category C – at least a small fire engine, Intervention unit at least 1+3, dispatch in 2 hours, total of 20+1 members.
- Category D – departments not included in system of nationwide coverage of fire units.

Distribution of volunteer fire departments in Žilina region is illustrated on figure 7. Departments are marked by color according to the category they belong to: A – red, B – yellow, C – green.

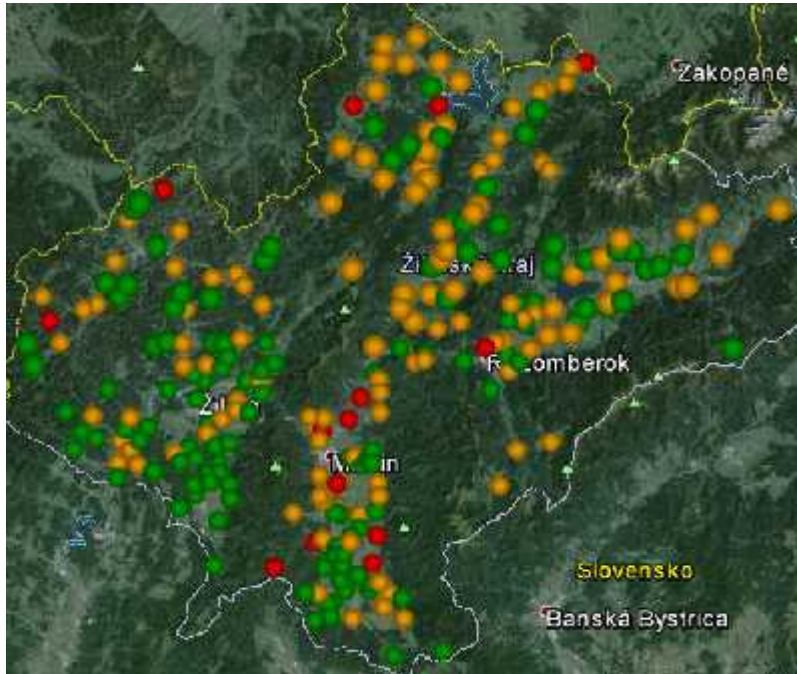


Figure 5: Distribution of volunteer fire departments in Žilina region Source: [7]

Volunteer fire departments are not evenly distributed. It does not reflect the real necessity of coverage with fire units.

5. THE OPERATIONAL MANAGEMENT OF INTERVENTIONS

The characteristics of interventions in natural environment:

- The need for deployment of high number of forces and means,
- Difficult-to-access terrain,
- The need for securing sufficient water transportation,
- Long duration,
- Lower requirement for expertise.

Forces and means of professional fire departments are usually insufficient, that is why volunteer fire departments are called in to the site of the incident. Even if there are only some

study focusing on economic analysis [8] using volunteerisms is undoubtable effective, Their task is principally to provide enough „manpower“ to secure successful intervention. They are also needed in difficult-to-access terrain to fight the fire with simple firefighting tools.

In terms of territorial jurisdiction, the categories of volunteer fire departments are defined as follows [9]:

- A – able to perform an independent, qualified intervention, can be deployed throughout whole district, if needed,
- B – able to perform an independent intervention, primarily in their respective village,
- C – assistance and support works during interventions, primarily in their respective village,
- D and excluded departments – not included in the system of nationwide coverage of forces and equipment.

When informed about a wildfire, the emergency coordination and operations center automatically dispatches local professional and volunteer fire unit (from category A) to the site of the incident, considering their distance from the site of the wildfire.

Besides the municipality and volunteers, the intervention commander needs to cooperate during the firefighting with owners or tenants of the endangered estate, with landlords, or different owners' community. They often dispose of forestry or agricultural technology that can be used to fight the fire. Principally if the terrain is too demanding for firefighters vehicles, or if it is necessary to carry out actions to prevent the spread of fire, such as create partition-breaks or field ploughing. The intervention commander in cooperation with mayor and magistrate can solve the issue of logistics supports of intervening units, possible water source, or supply of the drinks and food.

Activity of each group needs to be coordinate. The commander can establish directing staff to support his decisions which is especially difficult some times and requires quick decision [10]. The directing staff is recommended to establish if there is five or more fire units. When the third degree of fire alarm is declared, according to the fire-alarm plan, establishing the directing staff becomes necessary. Members of the directing staff are predetermined to take account of particular specific problems that may arise during fighting the fire. The staff is presided by chief, who has assistants to help, each of them responsible for expert service –

assistant for communication, machinery, anti-gas service, fire health and flood service. As appropriate, assistants of expert services are called to the directing staff, who are really necessary for intervention. During extreme forest fires a lot of people and technology is used, which can lead to various injuries, to prevent gas poisoning, some members use breathing apparatus. So there is a need for assistant for machinery, health, and anti-gas service. On the fire area, there is necessary to maintain some documentation; it can be done by assistant for documentation. Responsibility for all radio connection lies on an assistant for communication services. A supply with extinguish agent or other needed mater can be in competence of assistant for logistics. The directing staff is established in order to simplify the coordination of all units for the commander.

Problems of operational management at the site of the incident:

1. Intervention commander has not enough experience to lead a difficult intervention. According to the initial information it may seem as an easy intervention, what can lead to a fact that a younger and unexperienced officer is chosen as the incident commander. Until the request for additional forces and means he leads the intervention.
2. By law nr. 129/2002 about the Integrated Rescue System, the intervention commander is a member of Fire and Rescue Service even if there are more rescue services intervening on the place of the incident. The intervention commander coordinates and manages all intervening units. This implies that he needs tactical overview about all participating forces and means and about the whole situation. He has to establish the directing staff when the third degree of fire alarm is declared. If there are more firefighters units on the intervention place and the intervention commander doesn't establish the directing staff, management of firefighting may not be optimal because of a complicated situation.
3. The firefighting in natural environment often needs cooperation with different subjects; for example municipalities, agrarians, volunteers. Their activity also needs to be managed. Everyone should notify the intervention commander of their arrival. If they do not do this, intricate situations may occur.
4. Connection between operations centre and site of the incident. Coverage of SITNO network has dead spots. Majority of those spots is covered by network of a standard mobile provider, but there are some spots that are not covered at all, mainly in

mountainous region. In such case it is necessary to send one firefighter in a personal vehicle to an accessible spot to provide a radio connection.

6. CONCLUSION

Wildfires in Žilina region constitute a big part of interventions, are specific for high requirements of proper firefighting equipment and large amount of firefighters. In case of fire in the natural environment affect firefighting professional members with volunteer firefighters. Those are necessary for securing sufficient water transportation, the very liquidation of fire using hose lines as well as simple firefighting tools. Besides them, the fire-fighting also involved other subjects. Action of all the units must be coordinated and managed. Intervention commander needs to have accurate and updated overview of the overall situation in order to decide on the optimal way of management and intervention. As a decision support can be create a managing firefighting crew. In addition, about the method and the tactics often determines the subjective experience of commander but also his personality traits.

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