Good practice

Instruments used against forest fires in the Region of Epirus (Greece)

The Region of Epirus, located in the north-west part of Greece, faces a significant problem with forest fires during summer. The Region, the fire brigade and the forestry are trying to make the best use of the traditional instruments against forest fires, while at the same time they make an effort for the introduction of new instruments which will enable them to mitigate forest fires in an effective way.

Forest fire risk in Epirus

The first reason that makes forest fires a significant problem for Epirus is the existence of big areas covered with forests. Secondly, the morphology of the ground makes difficult extinguishing fires. The high mountains and the canyons prevent the vehicles of the fire brigade from having easy access to the site of fire. Another reason that increases the risk of forest fires is the climate of Greece. Although Epirus is not one of the driest areas of Greece, summers are dry making the vegetation in the forests extremely flammable.

Figure 1: forest fire in Greece

Numerous human activities near or in the forest also increase the risk of forest fires. Every day activities in villages in the forest, like barbeque, and activities related to agriculture or even tourism may cause forest fires. Actually, the number of human activities and the type of vegetation are the two basic factors that increase the risk of forest fire to an area.

Examples of areas with high risk of fires in Epirus are:

- the small forests around the cities of Ioannina and Igoumenitsa. These are typical examples of areas that combine a flammable type of vegetation (pine trees) with a big number of people living and acting nearby.
- touristic places near the coastline of Epirus.
- the mountains in the northern part of Epirus. These mountains are on the borders of Greece with Albania and there are cases in which forest fires are spreading from the one side of the borders to other.

Spatial instruments against forest fires

Since forest fires may have tremendous environmental and social impact, various instruments are used for their mitigation. Moreover, emphasis is given on quick spotting of forest fires, if they finally occur and on instruments that will make them cause the least possible damage. Below are

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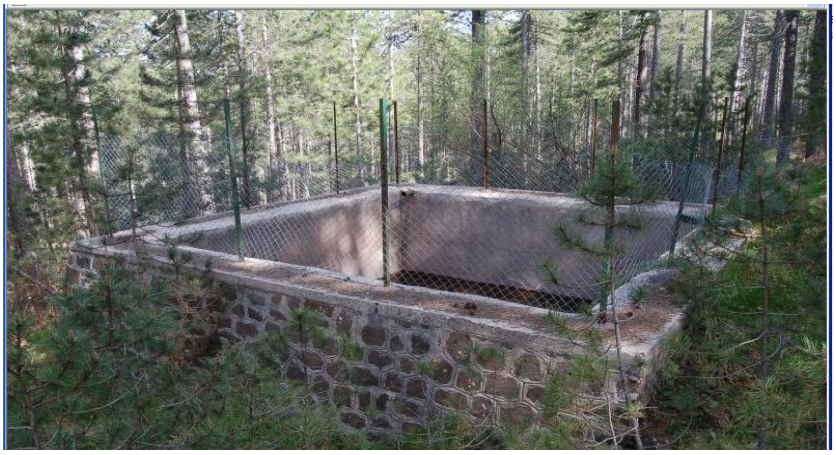


Figure 2: water tank

mentioned some of the basic instruments which are used against forest fires in Epirus.

- Creation of forest roads. These roads have multiple use. First of all, they act as zones that prevent fires from spreading when they occur. Secondly, they enable the fire brigade to have better access to the forest, while they can be used as evacuation routes in the case of forest fire.
- Creation of zones where vegetation is being cut. These zones prevent forest fires from spreading.
- Cleaning forests from dead organic material, such as dead trees, branches and bushes. That method is mainly used in the small forests near cities and not in a very large scale for two reasons. The first one is the cost which is high, while the second one is that dead organic material has a role in the natural circle of life in the forest. The second point indicates that even if there are funds available the removal of dead organic material should be applied only to high risk areas.
- Creation of looking towers in the forest. Looking towers make possible the quick spotting of fires, while volunteers can be used as observers.
- Creation of water tanks in the forest. Quick access of the fire brigade to water during a fire is vital, so two things should be taken into consideration when the location for the creation of the water tank is chosen: proximity to areas of high risk and accessibility of the place.
- Creation of pipe networks in the forest for transferring water. The high cost of that kind of infrastructure makes is appropriate for small areas of high risk, like small forests around cities.

Figure 3: looking tower

Mitigation policies

Apart from spatial instruments, there are also mitigation policies which can be applied and have very effective results. Below are mentioned some of them:

- Most of the forest fires are caused by negligence and is estimated that 35% of forest fires are having that cause. That percentage is even higher if we take into consideration that many of the forest fires of undetermined causes are also caused by negligence. That fact indicates the importance of the awareness of people. The General Secretariat of Civil Protection makes campaigns in order to inform people about the risk of forest fires.
- Prohibitions concerning certain actions like barbeque or burning branches during high risk periods.
- Prohibitions concerning all kind of human activities in an area, even walking. These prohibitions refer to very specific areas in the forest, which are of extremely high risk and are applied only during the days that the weather conditions increase the risk even more.
- Rules that oblige citizens to keep their land property clear in order to prevent fires.

An integrated early warning and fire man-management system

The Region of Epirus tries to use new technologies in the procedure of mitigating and tackling forest fires. In accordance to that policy an integrated system of early warning and fire management has been installed in the Regional Unit of Thesprotia. The system consist of two basic components: a sub-system of 4 cameras that enables people in the operation center, which is located in the building of the Regional Unit, to observe a big area covered with forest and a GIS system, used to produce thematic and fire risk maps. The project was co-financed by national and E.U funds.

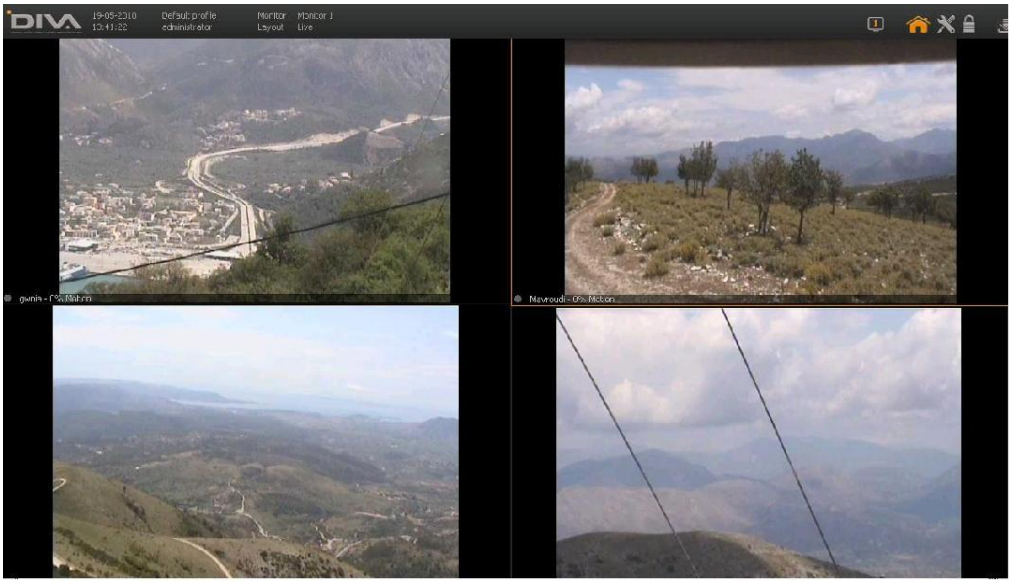


Figure 4: snapshot of the live videos of the system

The cameras component

The four cameras are located on the top of four mountains in order to cover the biggest area possible. The civil protection proposed these locations on the criterion of the high forest fire risk. The signal of the cameras is transferred wirelessly in the operation center and the people working there are able to see the live videos of the four cameras on a screen at the same time. The cameras are constantly moving circularly. When the operator of the system spots smoke, he can maximize the video of the camera covering the specific area. Moreover, he can move the camera (left, right, up, down) and focus on the place he wants.

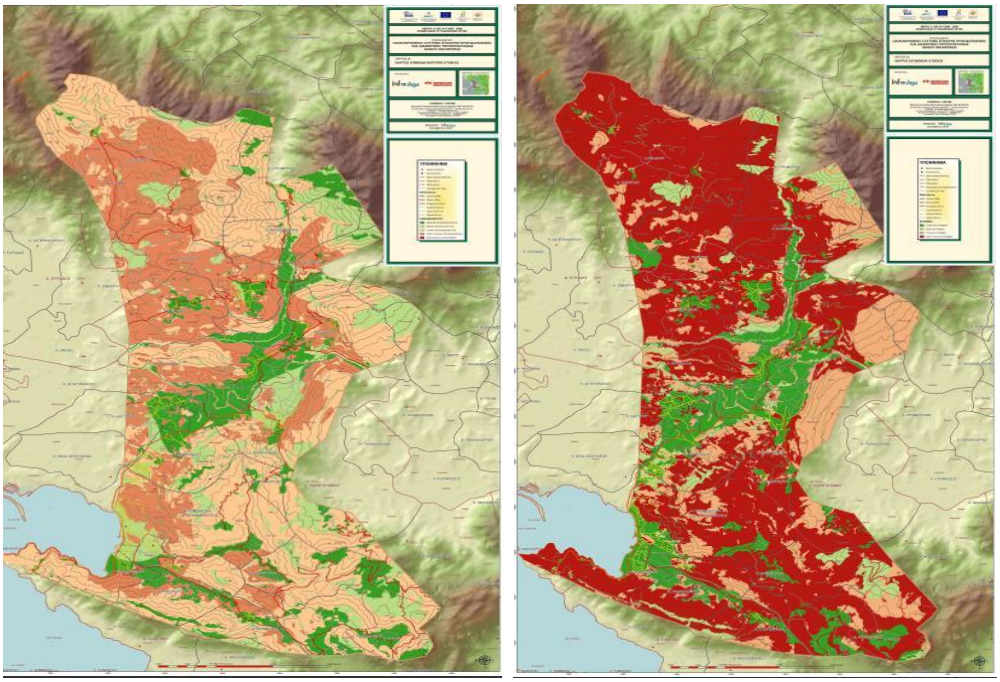
The system has also three meteorological stations which are located in the same places that three of the cameras are located. These stations transmit meteorological data which are used by the GIS component of the system. The meteorological stations use the same wireless system with the camer in order to transmit the data.

The autonomy of the cameras from an energy aspect was very important for the creation of the system, since on the top of some of the mountains there is no electricity network. Moreover, even if there was such a network, a forest fire would possibly destroy it disabling the cameras to transmit the live videos. The solution which was chosen was the installation of photovoltaic systems, giving to the system autonomy for 48 hours. That means that if the weather is cloudy for more than two days, the cameras do not work. However, this is quite unlikely to happen during summer, while there is always available the choice to enlarge the photovoltaic system, providing energy autonomy for more days.

The GIS component

The first step for the creation of the GIS subsystem was the creation of orthophotomaps and the collection and digitalization of cartographic data and spatial information descriptors. The second step was the creation of a model for the forest vegetation, which is actually the fuel model. Based on these data the system can create thematic and operational maps. The thematic maps

are about rivers, water points, kind of vegetation etc. The operational maps indicate the probability of a fire in an area, the high risk areas etc. The data of the meteorological stations are taken into consideration by the system for the creation of the operational maps.



Figures 5: operational maps

The operational maps are a useful tool when decisions about the mitigation policy are taken. For example places of high risk are those who should be given priority for the creation of fire protection zones and evacuation routes. Moreover, the system can run simulations where the user decides on different parameters such as wind, temperature, days without rain, place from which a fire starts etc. The simulations show how the spreading of a fire in a specific place is influenced by these parameters.

Lessons learnt

Below there are some important lessons learnt from the policies and the instruments used against forest fires in the Region of Epirus:

Figure 6: operation center

- The awareness of people about the dangers caused by human activities near/in the forest is important, since most of the fires are caused due to human negligence.
- It is important to involve local societies, mainly trough volunteer organizations, in the procedure of preventing/extinguishing fires and in the procedure of the recovery of an area after a fire.
- It is vital to keep the fire protection zones and the forest roads in good condition. The necessary actions should be taken very early in spring.
- The role of the fire brigade is outstanding and infrastructures like water tanks and networks of pipes with water points are useful tools supporting their operational ability. Moreover, the experience of the fire brigade is precious and should be taken into consideration when policies and plans for forest fires risk are set.
- New technologies can be a very helpful tool against forest fires.
- GIS systems can be used as a tool in order to spot areas of high risk and set a mitigation policy for them.

The MiSRaR project

The MiSRaR project is about Mitigation of Spatial Relevant Risks in European Regions and Towns. The project is a cooperation between seven partners in six EU member states:

- *the Safety Region South-Holland South, The Netherlands (lead partner)*
- *the city of Tallinn, Estonia*
- *the region of Epirus, Greece*
- *the province of Forlì-Cesena, Italy*
- *the municipality of Aveiro, Portugal*
- *the municipality of Mirandela, Portugal*
- *the Euro Perspectives Foundation (EPF), Bulgaria.*

The goal of the project is to exchange knowledge and experiences on risk mitigation in spatial policies. The project will result in a handbook in which the lessons on the mitigation process are described and the good practices from the partners are presented. The Risk Assessment and Mapping Guidelines for Disaster Management of the European Commission will be implemented in the handbook.

The MiSRaR project is cofinanced by the European Regional Development Fund and made possible by the INTERREG IVC programme.

www.misrar.eu

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