

GIS Decision Support System to reduce fire risk and improve wildfire suppression at inter-municipal scale. The Aveiro Region case

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Abstract

Wildland fires are becoming a main concern for the public administration. Their effects are devastating, resulting in important socio-economic and environmental losses every year. This fact lead national management agencies to tackle this problem in a more proactive way, investing in the creation of a large amount of legislation and action plans, that operate in a regional and municipal level, to reduce fire occurrence and burned area.

These action plans fostered the development of new methodologies to mitigate forest fires. This paper presents a procedure that tackles these issues by employing a user friendly interface, allied with cartographic information, leading to an enhanced land management assessment that will be able to foresee dangerous situations related with wildfires and help in wildfire suppression.

The methodology was applied to the group of municipalities that constitute the Municipality Association of the Ria. In total, there are eleven Municipalities occupying an approximate area of 1600 km², located in the littoral centre/north of Portugal, and have a population of approximately 350000 inhabitants

These areas are close to or drain the Ria de Aveiro, a large lagoon that occupies approximately 110 km², from which 60 km² are permanently flooded. A high percentage of this area is covered by forest stands, mainly pine and eucalyptus, that are frequently burned.

The methodology takes into consideration the various phases of a wildfire, such as the probability of fire detection and the phases of fire ignition, progression and suppression. Each one of these phases was carefully considered, so that they could represent the actual conditions in the field. To enable the latter, meteorological factors are included with the combination of the various physical factors, such as aspect, slope, water surfaces, buildings, routes, fire watchtowers, and so forth. To do so, a network of eleven meteorological stations give information in real time and are used as a spatial indicator, using kriging methodologies. This procedure also considers sensitive areas that need to be protected, in detriment to non-protected areas, so that each municipality's natural resources are preserved.

The assembly of the information is performed by GIS software, in order to create the tools and, consequently, the cartography. The end result is an instrument that is easy to use, with great potential in predicting source and direction of the fire, so that it can be effectively managed.

Key words: wildfire; management; risk; GIS.

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