



Optimal administrative units partitioning for static wildland fires risk assessment

P. Fiorucci, F. Gaetani, R. Minciardi

CIMA Centro di Ricerca Interuniversitario in Monitoraggio Ambientale, Università degli Studi di Genova e della Basilicata, Savona, Italy. (Francesco.Gaetani@unige.it / fax +39 010 353 2154)

Forest managers found wildland fire prevention and fire-fighting organization on a complex hierarchical structure, which usually include both central and local decision levels. The efficiency of such an organization is strictly related with the partition of the considered territory in suitable elementary administrative units.

In fact, since wildland fire risk can be considered as the product of several heterogeneous factors such as vegetation characteristics, local climate conditions, topography, and socio-economical aspects, it is obvious that the number and the quality of wildland fire fighting resources available in each considered administrative units can affect significantly the occurrence and the dynamics of the wildland fires events.

The observation of the phenomenon over a suitable space-time scale has proved that the frequency-area relationship of the occurred fires obeys to the power-law distribution. Therefore, it is worth to assume that such behaviour represent the convolution of different power law behaviour at smaller spatial scale that characterize the wildfire regime of some different sets of contiguous elementary areas (cluster).

In the paper, a methodology for the optimal administrative units partition, aiming at assessing the static wildfire risk at regional scale, is proposed and discussed in detail. To this end, a procedure to identify the clusters (administrative units) characterized by specific wildfire regimes is carried out, also taking into account the different fire seasons. Such clusters are made by groups of contiguous elementary areas, which show similar behaviour in connection to wildland fires phenomenon.

Since the complexity of the problem does not allow exploring all possible solution, an

approach based on genetic algorithms is proposed.

Liguria (5400 km²), a Region placed on the northwestern coastline of Italy, frequently affected by severe wildland fires occurrences, represents the case study relevant to the implementation of the proposed approach.

The validation of the proposed approach is based on the correlation analysis among the identified power law parameters, and the main variables involved in wildfire risk for the overall set of clusters that composes the considered territory. If the results will be confirmed by a deeper analysis, such kind of approach allows identifying the effect of each different static territorial component on the wildfire risk regime taking into account the fire fighting available resources.