

Assessing the Spatial Distribution and Size of Water Bodies for Fighting Forest Fires in Extremadura, Spain

Pulido, M., Barrena-González, J., Amine Abdennour, M., Castaño Martín, F. M., Gabourel Landaverde, A., Corzo Gajón, A., Lavado Contador, J. F. and Fernández de Castro Martínez, G.

Instituto Universitario de Investigación para el Desarrollo Territorial Sostenible (INTERRA), Universidad de Extremadura, 10071 Cáceres, España

Abstract

The spatial distribution of water bodies plays a crucial role in supplying water to combat forest fires in Extremadura, Spain. The region of Extremadura is characterized by a Mediterranean climate with hot and dry summers, which significantly increases the risk of forest fires. In this region, the high-risk fire zone (HRF) covers 15,415 km², which represents 37% of the total area. In this context, the strategic presence and size of water bodies, such as reservoirs, lakes, and livestock ponds, are essential to ensure an adequate water supply during fires. Therefore, the objective of this study was to analyse the spatial distribution and size of water bodies in HRF areas in Extremadura. To do this, a map of all existing water bodies in these areas was generated by combining hydrological information, the 1:10,000 topographic map, and historic and current orthophotos. In addition, to correctly identify the water bodies and their spatial distribution, were classified into 5 classes that vary according to size: (1) < 0.0001 km², (2) 0.0001-0.001 km², (3) 0.001-0.01 km², (4) 0.01-0.1 km², and (5) > 0.1 km². The results showed that the total number of identified water bodies is 32,086, covering a total area of 24.28 km², which represents 0.16% of the HRF. This represents a density of 2.08 water bodies/km². However, this density varies according to size. While the water bodies of class 1 have a density of 1.10 bodies/km², class 4 is only 0.02 water bodies/km². Regarding the total number by classes, class 2 had the most water bodies identified (16,976), and class 5 had the least (8). Regarding their spatial distribution, the results show that classes 1, 2, and 3 are distributed equitably and with an acceptable density throughout the HRF. However, class 4 and especially class 5 have a more uneven distribution throughout the HFR. In addition, in some natural regions where the recurrence of forest fires is higher, water bodies of a certain entity were not observed, which raises doubts about the correct supply of water for firefighting. In conclusion, it could be said that the density of identified water bodies in the HRF is acceptable. However, the distribution of larger classes deserves to be reviewed in areas of low density and with high rates of recurrence of forest fires.

Keywords: Water supply, Forest fires, Spatial distribution

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