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Modeling of natural risks in GIS, decision support in the Civil Protection and Emergency Planning

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The assessment of natural hazards in Civil Protection is essential in the prevention and mitigation of emergency situations. This paper presents the results of the development of mapping susceptibility to landslides, floods, forest fires and soil erosion, using GIS (Geographic Information System) tools in two municipalities - Santo Tirso and Trofa – in the district of Oporto, in the northwest of Portugal.

The mapping of natural hazards fits in the legislative plan of the Municipal Civil Protection (Law No. 65/2007 of 12 November) and it provides the key elements to planning and preparing an appropriate response in case some of the processes / phenomena occur, thus optimizing the procedures for protection and relief provided by the Municipal Civil Protection Service. Susceptibility mapping to landslides, floods, forest fires and soil erosion was performed with GIS tools resources. The methodology used to compile the mapping of landslides, forest fires and soil erosion was based on the modeling of different conditioning factors and validated with field work and event log. The mapping of susceptibility to floods and flooding was developed through mathematical parameters (statistical, hydrologic and hydraulic), supported by field work and the recognition of individual characteristics of each sector analysis and subsequently analyzed in a GIS environment

The mapping proposal was made in 1:5000 scale which allows not only the identification of large sets affected by the spatial dynamics of the processes / phenomena, but also a more detailed analysis, especially when combined with geographic information systems (GIS) thus allowing to study more specific situations that require a quick response.

The maps developed in this study are fundamental to the understanding, prediction and prevention of susceptibility and risks present in the municipalities, being a valuable tool in the process of Emergency Planning, since it identifies priority areas of intervention for farther detail analysis, promote and safeguard mechanisms to prevent injury and it anticipates the possibility of potential interventions that can minimize the risk.