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Multi-criteria site selection for fire services: the interaction with analytic hierarchy process and geographic information systems

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Abstract. This study combines AHP and GIS to provide decision ma with a model to ensure optimal site location(s) for fire stations sele The roles of AHP and GIS in determining optimal locations are expl criteria for site selection are outlined, and case study results for fir optimal fire station locations in Istanbul, Turkey are included. The c Istanbul has about 13 million residents and is the largest and mos populated city in Turkey. The rapid and constant growth of Istanbu resulted in the increased number of fire related cases. Fire inciden to increase year by year in parallel with city expansion, population hazardous material facilities. Istanbul has seen a rise in reported f incidents from 12 769 in 1994 to 30 089 in 2009 according to the ir report of Istanbul Metropolitan Municipality Department of Fire Brig average response time was approximately 7 min 3 s in 2009. The (this study is to propose optimal sites for new fire station creation t the Fire Brigade in Istanbul to reduce the average response time t or less. After determining the necessity of suggesting additional fir stations, the following steps are taken into account: six criteria are considered in this analysis. They are: High Population Density (HPC Proximity to Main Roads (PMR); Distance from Existing Fire Stations Distance from Hazardous Material Facilities (DHM); Wooden Buildin Density (WBD); and Distance from the Areas Subjected to Earthqu (DER). DHM criterion, with the weight of 40%, is the most importan criterion in this analysis. The remaining criteria have a weight rang 9% to 16%. Moreover, the following steps are performed: represe of criterion map layers in GIS environment; classification of raster c calculating the result raster map (suitability map for potential fire s and offering a model that supports decision makers in selecting fir sites. The existing 35 fire stations are used and 17 fire stations ar suggested in the study area.

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