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EVALUATION OF LAND DEGRADATION AFTER FOREST FIRE USING A FUZZY LOGIC MODEL

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Abstract

This study presents a simple, synoptic and suitable for continuous monitoring model based on the fuzzy logic to monitor land degradation after a forest fire in a Spanish Mediterranean coastal area. The model combined topography and vegetation information to assess land degradation status. Topography parameters, slope and aspect were derived from a digital elevation model (DEM). Evidences about the soil status were obtained by analyzing the vegetation cover with remote sensing images. The Normalized Difference Vegetation Index (NDVI) was used to assess vegetation cover.

As an initial approach, the model was proven efficient in assessing vulnerability to land degradation and further developments of this framework could generalize and evolve the model. The model was calibrated with USLE cartography by employing ROC curves to assign the most reliable membership functions weights. A maximum ROC area under the curve value (ROC=0.835) was obtained with a weight of 0.6 for NDVI, 0.35 for slope and 0.05 for the aspect. Model results endorses the potential of using digital elevation models and vegetation indices obtained through satellite images to assess soil vulnerability in large areas with a simple and easy-to-update method.

Key words: fuzzy logic, land degradation, remote sensing, soil erosion

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