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Post-fire soil erosion risk map in Portugal: prediction and validation

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Wildfires are a recurrent and increasing threat in Mainland Portugal, where over 4,500 thousand hectares of forests and shrublands have burned in the last 38 years. Landscapes affected by those wildfires have suffered an increase of soil erosion processes, which can negatively affect soil carbon storage, reduce fertility, forest productivity, and become a source of pollutants. Taking these in mind, the main objective of this study is to offer a ground base of post-fire soil erosion risk determination for Mainland Portugal, which will provide a set of tools to help forest managers in the post-fire decision-making, and therefore adequately implement mitigation measures to prevent such impacts.

Post-fire soil erosion was assessed by the applying the semi-empirical soil erosion model Revised Morgan–Morgan–Finney(Morgan, 2001), to the entire Portuguese forest and shrubland areas according to distinct scenarios (burn severity, climate). This study benefits from the use of several reliable official datasets of soil characteristics, as also from several model calibrations and validation with field data collected in the last 10 years for the 1st and 2nd post-fire years. The obtained soil erosion map identifies areas with higher post-fire erosion risk in the past and for future climate extremes. Findings of this study will be a valuable tool for forest managers to minimize the economic and environmental losses of vegetation fires in Portugal.

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