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Soil erosion after the 2017 forest fire of Braga (Portugal)

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Soil erosion promoted by rainfall constitutes a major land degradation process. The occurrence of heavy, often localized, precipitation can cause severe erosion and increase the risk of flash flooding and debris flow. However, its occurrence in very specific situations, such as in areas affected by forest fires, changes significantly the behavior of the different factors and processes, as well as the conditions related with erodibility, contributing for an increasing erosion risk.

Several studies have shown strong and sometimes extreme responses in runoff generation and soil loss following fires, especially during the first 4 to 6 months after the fire. In Portugal this is a period of greatest vulnerability to erosion because of the maximum fire potential in summer (July–August) and the likelihood of intense post-wildfire rainfall the following autumn–winter (November–January).

In fact, forest fires produce a major impact on soil, being considered the major cause of soil degradation and desertification, and promoting significant changes on landscape features and landforms.

In the present study case, following the October 2017 forest fire in Braga and the subsequent storm that affected the burnt area, it was possible to identify the erosive processes that occurred and their consequences, which are presented in this work. The visual assessment of the erosive action on the slopes in the burned areas detected the development of critical areas with a higher concentration of erosion, in the areas most affected by fire, with steep slopes and where the anthropic action is more active (unpaved forestall roads and other anthropic infrastructures). These effects were surveyed with UAV and modeled in GIS environment. Erosion plots were also used to quantify soil erosion. The evidence found in the area affected by the fire in Braga and in the city itself demonstrates the serious impacts of forest fires on the soil, namely in terms of its erosion and degradation, and consequent impacts on the downstream areas, especially when it comes to urban areas.

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