The role of rainfall frequency and magnitude on soil erosion in burnt areas

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Soil erosion promoted by rainfall constitutes a major land degradation process, due to the effect of raindrops energy and runoff. This fact is particularly significant in the Mediterranean region where precipitation patterns are highly variable in terms of time, space, amount and duration of events. The occurrence of heavy, often localized, precipitation can cause severe erosion and increase the risk of flash flooding and debris flow.

Many studies have addressed rainfall characteristics and its role on soil erosion. 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.

In fact, forest fires produce a major impact on soil, being considered the major cause of soil degradation and desertification, and promote significant changes on the hydrologic and geomorphic response of a catchment to rainfall events, increasing subsequent soil erosion.

This problem is increasing in order with the increasing patterns of forest fires we have witnessed, namely in Mediterranean countries.

In Portugal, as well as in other Mediterranean countries, wildfires and burnt areas have increased significantly since 1970. This rising trend observed in Portugal, although encompassing some periods of lower burnt areas, is characterized by a high number of ignitions and a great proportion of burnt areas, particularly in the central and northern regions, as occurred in 2017, when the an annual maximum of burnt area of 500.00 ha was reached.

The removal of vegetation by fire increases the amount of effective rainfall, causing an increasing erosion risk, also dependent on rainfall characteristics.

Consequently, knowledge of rainfall frequency and magnitude is fundamental for soil erosion and landscape evolution understanding, as well as for intervention and management of areas affected by forest fires and implementation of emergency mitigation measures.

Therefore, the main objective of this presentation is to discuss the role of rainfall frequency and magnitude on erosion, especially in areas affected by forest fires in the Mediterranean region, and the role of emergency mitigation strategies in the prevention of soil erosion, using some examples of burnt areas in northern and central Portugal.

Key words: Rainfall; Frequency; Magnitude; Soil Erosion; Emergency Mitigation Measures.