Post-Fire Erosional Processes in the Pacific Northwest and Rocky Mountain Regions

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Abstract:

The objective of this paper is to provide a general overview of the influence of wildland fires on the erosional processes common to the forested landscapes of the western United States. Wildfire can accelerate erosion rates because vegetation is an important factor controlling erosion. There can be great local and regional differences, however, in the relative importance of different erosional processes because of differences in prevailing climate, geology and topography; because of differences in the degree to which vegetation regulates erosional processes; and because of differences in the types of fire regimes that disrupt vegetative cover. Surface erosion, caused by overland flow, is a dominant response to wildfire in the Interior Northwest and Northern Rocky Mountains (Interior region). A comparison of measured post-fire infiltration rates and long-term records of precipitation intensity suggest that surface runoff from infiltration-excess overland flow should also occur in the Coastal and Cascade Mountains of the Pacific Northwest after fires, but this has not been documented in the literature. Debris slides and debris flows occur more frequently after wildfire in the Interior region and in the Coastal and Cascade Mountains of the Pacific Northwest (Pacific Northwest region). Debris flows can be initiated from either surface runoff or from soil-saturation-caused debris slides. In the Pacific Northwest region, debris flows are typically initiated as debris slides, caused by soil saturation and loss of soil cohesion as roots decay following fire. In the Interior region, both overland-flow-caused and debris-slide-caused debris flows occur after wildfire. Surface erosion, debris slides, and debris flows all occur during intense storms. Thus, their probability of occurrence depends upon the probability of intense storms occurring during a window of increased susceptibility to surface erosion and mass wasting following intense wildfire.

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