

Post-fire logging in Mediterranean pine forests – An overall assessment of ecological effects

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Abstract

Recent increases in the number and extent of wildfires in Mediterranean Europe, the United States and Australia have intensified the debate on post-fire logging. Alternate views about post-fire logging either as one key component of rehabilitation and restoration efforts or as detrimental to forest recovery are both held. However, very little is known about the ecological effects of post-fire logging, and scientific data support the argued pros and cons are lacking. Here we present data from an extensive, long-term study of the ecological effects of post-fire logging in Mediterranean pine forests. We studied 11 sites – six *Pinus halepensis* forests and five *Pinus pinaster* forests affected by wildfires in eastern Spain. Depending on the site, post-fire logging was applied between six months and two years after the wildfire. Within each site, we selected paired logged and control (unlogged) slopes. We evaluated treatment effects on plant and soil recovery at the short term (i.e., 2-3 years after post-fire logging), and the long-term (i.e., 9 years after the wildfires). In the logged area, we measured the number and size of all the rills on the slope and calculated the soil loss by rill erosion. In the short term, post-fire logging significantly reduced plant cover, particularly in those areas where small unmerchantable woody materials were piled and burned, and significantly increased the percentage of soil surface affected by degradation. However, these differences diminished with time and were negligible nine years after the wildfire. Density and morphological characteristics of pine seedlings and saplings did not show any effect of post-fire logging. Post-fire logging caused soil loss by rill erosion in most of the study sites, with soil loss values ranging from 7.0 to 51.2 Mg ha⁻¹ year⁻¹ for the first 2-3 years after post-fire logging. Our data show that, for common Mediterranean conditions, post-fire logging slightly alters plant recovery. However, on sensitive soils, there is a high risk of soil degradation and rill erosion due to post-fire logging. Post-fire management approaches focused on selected site-specific practices that avoid sensitive areas, apply soil conservation measures, and avoid burning of logging residues are recommended.

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