



Advancements in Hydrology and Erosion Process Understanding and Post-Fire Hydrologic and Erosion Model Development for Semi-Arid Landscapes

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Fire activity continues to increase in semi-arid regions around the globe. Private and governmental land management entities are challenged with predicting and mitigating post-fire hydrologic and erosion responses on these landscapes. For more than a decade, a team of scientists with the US Department of Agriculture has collaborated on extensive post-fire hydrologic field research and the application of field research to development of post-fire hydrology and erosion predictive technologies. Experiments funded through this research investigated the impacts of fire on vegetation and soils and the effects of these fire-induced changes on infiltration, runoff generation, erodibility, and soil erosion processes. The distribution of study sites spans diverse topography across grassland, shrubland, and woodland landscapes throughout the western United States. Knowledge gleaned from the extensive field experiments was applied to develop and enhance physically-based models for hillslope- to watershed-scale runoff and erosion prediction. Our field research and subsequent data syntheses have identified key knowledge gaps and challenges regarding post-fire hydrology and erosion modeling. Our presentation details some consistent trends across a diverse domain and varying landscape conditions based on our extensive field campaigns. We demonstrate how field data have advanced our understanding of post-fire hydrology and erosion for semi-arid landscapes and highlight remaining key knowledge gaps. Lastly, we briefly show how our well-replicated experimental methodologies have contributed to advancements in hydrologic and erosion model development for the post-fire environment.