# Application of the rangeland hydrology and erosion model to burned rangeland and forested hillslopes in the southwestern United States

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Erosion and runoff have been observed to increase following fire. Land managers must be able to estimate these post-fire changes. Studies of post-fire erosion in burned watersheds show that the concentrations of sediment eroded from burned rangeland and forested hillslopes in the southwestern United States can be extremely high. Since wildfire primarily impacts soils and vegetation cover on hillslopes, it is appropriate to assume that changes in hillslope conditions will result in changes in runoff peak, volume and sediment yield. The Rangeland Hydrology and Erosion Model (RHEM) is a newly conceptualized model that was adapted from relevant portions of the Water Erosion Prediction Project (WEPP) Model and modified specifically to address rangelands conditions. RHEM is an event-based model that estimates runoff, erosion, and sediment delivery rates and volumes at the spatial scale of the hillslope and the temporal scale of a single rainfall event. It represents erosion processes under normal and fire-impacted rangeland conditions. Moreover, it adopts a new splash erosion and thin sheet-flow transport equation developed from rangeland data, and it links the model's hydrologic and erosion parameters with the rangeland plant community by providing a new system of parameter estimation equations based on diverse rangeland datasets for predicting runoff and erosion responses on rangeland sites distributed across 15 western U.S. states. In this paper RHEM is applied to pre- and post-fire conditions at the Empire Ranch, northeast of Sonoita, Arizona. The evaluation indicated the ability of the model to predict relative erosion rates with a satisfactory range of error for burned conditions.