

Quantifying decadal-scale erosion rates and their short-term variability on ecological sites in a semi-arid environment

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Soil erosion rates on six semi-arid loamy upland rangeland sites located in southeastern Arizona were measured using rainfall simulator and ¹³⁷Cs fallout method. Site characteristics that have greatest effects on soil erosion and runoff were identified. Long term (50 years) soil erosion rates as estimated using ¹³⁷Cs method varied between 5.1 t ha⁻¹ y⁻¹ and 11.0 t ha⁻¹ y⁻¹ and showed significant differences between Historic Climax Plant Community and Mesquite/Native states of the States and Transition Model. Erosion rates measured under simulated rainfall varied greatly, as much as 8-fold on the same location, depending on the time of the simulation. Temporal variability of erosion rates within a site was in some cases much greater than inter-site differences. This variability was attributed to natural or management driven changes of plant community and soil characteristics. For meaningful interpretation rainfall simulation results must be placed in the context of the range of possible vegetation and surface conditions of a given ecological site.

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