Abstract

Several modeling systems are being developed to provide spatially distributed runoff and soil erosion predictions for conservation planning. Ephemeral gully erosion is not included in the USDA-NRCS Natural Resources Inventory (RRI) database and is not accounted for in the Revised Universal Soil Loss Equation (RUSLE2). New distributed application called RUSLER (RUSLE2-Raster) predicts distributed runoff and soil loss and its output can be linked with the new Ephemeral Gully Erosion Estimator (EphGEE). Digital representations of the area of interest are created using high resolution topographic data and then parameterized using field observed data. This modeling system is used to estimate ephemeral gully erosion and sediment delivery to field channels.

RUSLER short for RUSLE2-Raster

estimates two-dimensional sheet and rill erosion and sediment delivery to field channels.

EphGEE - Ephemeral Gully Erosion Estimator

is a one-dimensional numerical model that estimates ephemeral gully erosion by determining detachment due to the shear stress caused by flowing water, and also estimates sheet, rill and ephemeral gully erosion. EphGEE was used to estimate ephemeral gully erosion from wide channels.

Results

While ephemeral gully erosion contributions are minor compared to sediment loss in wide channels, ephemeral gullying can contribute to channel degradation and deposition. Deposition occurs at a rate of 3 Mg ha\(^{-1}\) y\(^{-1}\) in the RUSLER simulated ephemeral gully.

Field Site for Testing

RUSLER and EphGEE simulations without any local calibration were compared with RUSLE2 raster DEM, results indicate that ephemeral gully erosion contributed about 30% of the sediment delivered from the watershed.

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Cross Section #2

EphGEE estimated both channel degradation and aggradation. Deposition occurs at a rate of 3 Mg ha\(^{-1}\) y\(^{-1}\) in the RUSLER simulated ephemeral gully.

With a 6.3 ha! watershed, the ephemeral gully was located in the channel network that resembled the gullies observed in aerial photos. The ephemeral gully contributed about 30% of the sediment delivered from the waterbody.

REFERENCES