

Distributed soil loss estimation system including ephemeral gully development and tillage erosion

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Abstract A new modelling system is being developed to provide spatially-distributed runoff and soil erosion predictions for conservation planning that integrates the 2D grid-based variant of the Revised Universal Soil Loss Equation, version 2 model (RUSLER), the Ephemeral Gully Erosion Estimator (EphGEE), and the Tillage Erosion and Landscape Evolution Model (TELEM). Digital representations of the area of interest (field, farm or entire watershed) are created using high-resolution topography and data retrieved from established databases of soil properties, climate, and agricultural operations. The system utilizes a library of processing tools (LibRaster) to deduce surface drainage from topography, determine the location of potential ephemeral gullies, and subdivide the study area into catchments for calculations of runoff and sheet-and-rill erosion using RUSLER. EphGEE computes gully evolution based on local soil erodibility and flow and sediment transport conditions. Annual tillage-induced morphological changes are computed separately by TELEM.

Key words water erosion; tillage erosion; ephemeral gully erosion; sediment; sedimentation; waterway