

CDI Statement of Interest

SECTION 1 PROJECT ADMINISTRATIVE INFORMATION

Science Support Framework Elements: Computational Tools & Services, Data Management, Science Data Lifecycle, Models

Project Title: Predicting Soil Loss with ArcGIS and RUSLE in the contiguous United States

Lead USGS cost center: USGS Upper Midwest Environmental Sciences Center (UMESC)

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Project Description: The Revised Universal Soil Loss Equation (RUSLE) assists scientists in determining potential soil loss by considering climate, soil, topography, and land use factors. Currently, a multi-step workflow integrating several input datasets and various nested equations would be required to quantify soil loss in ArcGIS. This project would develop a Python script tool in ArcGIS to allow scientists and others using RUSLE to create a soil loss prediction raster through the use of a streamlined ArcGIS tool. Default tool inputs will use national scale datasets (i.e. National Land Cover Database - NLCD, Gridded Soil Survey Geographic Database - gSSURGO), with the option for users to input higher resolution datasets for their desired area of interest.

Deliverable Product: ArcGIS Script Tool for quantifying soil loss using RUSLE; USGS Fact Sheet

SECTION 2 ESTIMATED BUDGET

Budget Category	Federal Funding "Requested"	Matching Funds "Proposed"
1. PERSONNEL		
Federal Personnel Total:	\$35,000	\$4,100
Contract/Collaborator Personnel Total:	\$1,600	\$5,800
Total Salaries:	\$36,600	\$9,900
2. TRAVEL EXPENSES		
Travel Total x 1 Trip:	\$1,000	\$2,000
Other Expenses:	-	-

Total Travel Expenses:	\$1,000	\$2,000
3. OTHER DIRECT COSTS:		
Equipment:	-	-
Publication Costs:	\$1,500	\$500
Office Supplies, Training, Other:	-	\$300
Total Other Direct Costs:	\$1,500	\$800
Total Direct Costs:	\$39,100	\$12,700
Indirect Costs (%):	18.62%	18.62%
GRAND TOTAL:	\$46,380.42	\$15,064.74

SECTION 3 PROJECT SUMMARY

The Revised Universal Soil Loss Equation (RUSLE), developed by the U.S. Department of Agriculture, allows for the quantitative estimation of potential soil loss based on a number of factors. The equation includes several parameters (erosivity, soil erodibility, slope length, slope steepness, cover management, and supporting practices), each of which often involves another equation or combination of factors to determine a value. Previous predictive soil loss work includes various tools to calculate potential soil loss at different scales or narrowly focused extents, and most of the available tools are outdated or difficult to utilize. Determining soil loss spatially within a GIS requires a complex workflow and combination of datasets.

This project seeks to improve upon previous attempts to determine potential soil loss amounts through the creation of a RUSLE ArcGIS script tool. The general components of the tool include:

- using open source programming software (Python); making it replicable/adaptable for other users/interested parties
- integrating a variety of datasets: NLCD, gSSURGO, elevation data (NED or 3DEP), precipitation
- input parameters and processing extent that can be altered by the user; includes a detailed explanation of each factor
- input datasets for a particular factor can be substituted with a higher resolution dataset if available

Collaborations of project involve:

- USDA NRCS reference for technical concerns regarding soil loss
- data mining/preparation by UMESC GIS student interns; offering undergraduate students an opportunity to be involved with a multi-organizational project while furthering their GIS skills

This proposed RUSLE ArcGIS script tool would offer an intuitive user interface to easily integrate a variety of contiguous U.S. datasets that would allow scientists and land managers to produce quantitative estimates of potential soil loss and visually assess the spatial distribution of possible erosion.