
Soil Erosion and Sediment Deposition Prediction

Soil erosion and sediment deposition can be significant environmental issues on military training lands. Accurate modeling and mapping of current erosion conditions and potential erosion risk can assist military land managers and trainers in optimizing training schedules, delineating training areas, and monitoring the impacts of training over time. Soil erosion status is also the primary criterion used by the Army Training and Testing Area Carrying Capacity (ATTACC) methodology to determine environmentally sustainable levels of military activities.



To date, the primary models utilized to estimate soil erosion on military lands have been the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE). These models suffer from a variety of deficiencies that limit their applicability to military lands: (1) they predict soil erosion 'universally' throughout an entire landscape, even where deposition is taking place, (2) they are incapable of predicting sediment deposition, (3) they have a tendency to over-predict net soil loss, (4) they cannot account for convergence, divergence and other complexities of slopes that greatly affect soil erosion and deposition, and (5) they predict only sheet and rill erosion; they do not consider gully erosion.

CEMML has been instrumental in the development, testing, and application of the Unit Stream Power Erosion and Deposition (USPED) model, a three-dimensional derivative of the USLE/RUSLE that overcomes many of their deficiencies. The USPED model predicts both soil erosion and sediment deposition, is applicable to complex terrain typical of military training and testing lands, and has been shown to account at least partially for gully erosion as well as sheet and rill erosion.

CEMML provides erosion and sediment modeling capability for military installations. Utilizing climatic data, digital soil surveys, digital elevation maps, satellite imagery and Land Condition Trend Analysis (LCTA) field data, CEMML produces GIS data layers and maps that quantify soil erosion and sediment deposition on a spatially distributed basis. This data can be used to drive the ATTACC methodology. When combined with erosion risk maps also produced during the process, the results can be used for planning of military training and testing activities as well as Land Rehabilitation and Maintenance (LRAM) projects.

