Agronomic Principles in Support of Military Land Sustainment

R. M. Lacey and A. B. Anderson
Engineer Research and Development Center
Construction Engineering Research Laboratory
Champaign, IL

Plant and Soil Management Related R&D Provides These Tools

Issues

- Army lands lose an estimated 3 tons of soil per acre annually - sustainable soil loss should be less than one ton/acre/year
- Excess beyond this level may be considered a non-point source pollutant
- Many current erosion control technologies were developed for agricultural lands and are prone to failure under sustained impacts
- 50% of all revegetation projects fail due to improper plant material selection
- The vast majority of Army training lands occur in arid and semiarid areas
- A backlog in land rehabilitation needs exists – requiring a capability to rank and prioritize projects based on probability of success, regulatory compliance, and training mission

Major Drivers

- Sikes Act of 1960 and its Amendments
- National Environmental Policy Act of 1969
- The Army Strategy for the Environment (2004)
- Army Regulation 350-19 – Sustainable Range Program (2005)
- Army Regulation 200-1 – Environmental Protection and Enhancement (2007 update)
- Army Sustainability Campaign Plan (2009)

Objectives and Benefits

- Technologies that are unique to military land use and account for intensive use, land damage, scheduling, and operational considerations.
- Technologies that insure that resources are available and functional for mission success.
- Plant management and erosion control technologies that improve land management strategies to sustain lands and their resources.
- Durable solutions that lower life cycle costs and standardize the erosion control process to maximize return.

Revegetation

Improved Cultivars

Wear resistance
Fast germination

Cryptogamic Inoculants

Soil Amendments

Fly ash, composts
solid waste

Ecological Bridge Seedings

Control

Herbicide Micro-Dose Response

Biological Control for Invasive Weeds

Altered Mycorrhizal Communities

Evaluation of Plant Growth Regulators

Engineering

Firing Points

Stream Crossings

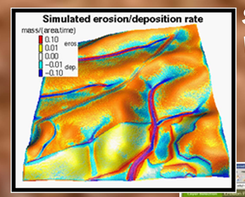
Site Stabilization

Drop Zones

Improved design

Automated Tools

Terrain Analysis and Erosion Product

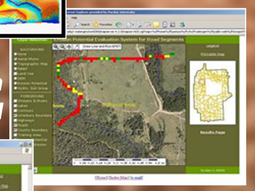


Simulation of Water and Erosion

Land Rehabilitation Guidance

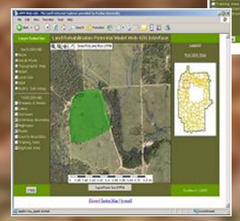
Sediment Erosion Control Planning and Design Specification (SedSpec)

Erosion Prediction Estimation Tool

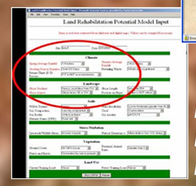


Vegetation Practice Design Application (VegSpec)

Land Rehabilitation Potential Model



Best Management Practice (BMP) reference library



Contributing Researchers

Army Engineer Research and Development Center
R. R. Busby, Construction Engineering Research Laboratory
T. J. Cary, Cold Regions Research and Engineering Laboratory
M. L. Denight, Construction Engineering Research Laboratory
Dr. D. L. Gebhart, Construction Engineering Research Laboratory
H. R. Howard, Construction Engineering Research Laboratory
D. Koch, Construction Engineering Research Laboratory
Dr. C. R. Mudge, Environmental Laboratory
Dr. L. S. Nelson, Environmental Laboratory
A. J. Palazzo, Cold Regions Research and Engineering Laboratory
Dr. J. F. Shearer, Environmental Laboratory
Dr. M Sharif, Construction Engineering Research Laboratory
N. G. Svendsen, Construction Engineering Research Laboratory

Future R&D Work Packages

Planned

- Optimal Allocation of Land for Training and Non-training Uses
- Multi-Scale Assessment of Altered Fire Regimes
- Prediction and Adaptation of Military Infrastructure in Response to Uncertain Futures
- Ecological Approaches to Sustainable Missionscapes
- Carbon Sequestration as a Training Land Sustainment Tool

Notional

- Resilient Eco-Engineering Under Multiple Stressors
- Functional Repudiation of Plant Invasion through Microbial Feedback Controls