Photo by: Dennis Hoffman

Sediment Setback

Fort Hood's sediment and erosion cause problems for the base

Since 1942, Fort Hood has been home to the U.S. Army's III Mobile Armored Corps. It is the only U.S. military post able to station and train two armored divisions at once. At this base, troops execute weapons qualification tasks and tank gunnery training to equip them to become some of the best soldiers in the country.

The heavy artillery traffic that operates on the 335-square-mile terrain greatly disturbs and deteriorates the soil and vegetation, causing serious topsoil loss and sediment problems. Direct raindrop impact on the pulverized bare soil leads to erosion and sediment-filled runoff, which deteriorates the land and contaminates local water sources. For this reason, the Texas Water Resources Institute (TWRI) and Blackland Research and Extension Center (BREC) are working with the military and USDA Natural Resource Conservation Service in attempting to conserve and protect the soils on the base, reduce sedimentation problems, and enhance training opportunities for future soldiers.

Sediment's Dangers

Sediment-filled runoff ends up in Lake Belton, the water source for Fort Hood and local communities. Ultraviolet light, or sunlight, naturally kills bacteria; therefore, suspended sediment in the area's water is particularly problematic because of its ability to diminish the water's light absorption. Sediment can also spread absorbed hazardous chemicals or compounds such as pesticides through the water.

In addition, the trampling of plants deteriorates the vegetation, changing from taller plants to shorter grasses. In extreme cases, the soil is exposed. Erosion at Fort Hood strips the land of essential nutrients that plants need to grow, and destroys any chance that the vegetation will redevelop on its own. Further trampling and erosion exposes the rocks beneath the soil and produces large gullies, or ditches. This has negative effects on military maneuvering and watershed ecology, permanently destroying surrounding habitats, and diminishing the quality of the training grounds.

Hope in Sight

Restoration at an early stage provides hope for success because some of the nutrients are still available in the soil. It also saves money because restoration can be expensive if starting over from scratch.

Proper use of vegetation, the most important element in land rehabilitation, can improve the sediment problem. Vegetation protects the soil from damage, and vegetation and soil work together to maintain a nutrient balance. It also acts as a filter to remove sediment from run-off, preventing the sediment from entering lakes and rivers. Plants also reduce the speed of water flow over the soil, slowing erosion.

The future looks more optimistic for Fort Hood thanks to TWRI, BREC, and NRCS's introduction of new ways to protect the area's land and water. One of the new practices being introduced is the use of compost to more rapidly establish protective regetative cover. Another effective solution is installing small check-dams, also called "gully-plugs," across eroding channels, which prevents further erosion by blocking the flow of water and reducing sediment loads in runoff. Another solution is soil ripping, which rejuvenates the soil and provides opportunities for growth and plant stability improvement. Water flows into the soil, rather than turning off and eroding trenches.

Because of the nature of Fort Hood's training, erosion and sediment will always be a problem. The efforts of TWRI and BREC on this project minimize the problems and provide hope for safety and excellence at this base.

Supporting Student Research

The Texas Water Resources Institute (TWRI) will fund 10 graduate student research projects for 2005-06 conducted by graduate students and researchers at Texas A&M University, Rice University, Texas A&M University Kingsville, Baylor, and the University of Texas at Austin.

Funded by TWRI through the U.S. Geological Survey as part of the National Institutes for Water Research annual research program, TWRI will publish articles and reports about the progress of these studies.

Grants began March 1, 2005, and will run through February 28, 2006. Awarded up to $5,000 to begin, expand, or extend research projects, each applicant had to also provide evidence of $10,000 in matching funds. TWRI received over 70 submissions in response to this year's request for proposals.

The following projects were funded:

- "Evaluation of Standards for Compost Blankets in Stormwater Control," Lindsay Birt, Department of Biological and Agricultural Engineering at Texas A&M University; Russell Persyn, research advisor.
- "Evolution of Irrigation Scheduling Using the Biotic Model," Josh Bynum, Department of Soil and Crop Sciences at Texas A&M University; J. Tom Cothren, research advisor.
- "Enhancing a Distributed Hydrologic Model for Storm Water Analysis within GIS Framework in an Urban Area," Zheng Fang, Department of Civil and Environmental Engineering at Rice University; Philip Bedient, research advisor.
- "Assessing the Potential of Zerovalent Iron to Reduce Nitrate Mobility," Omar Harvey, Department of Soil and Crop Sciences at Texas A&M University; Cristine Morgan, research advisor.
- "Determining the Efficacy of Biological Control of Saltcedar on the Colorado River of Texas," Jeremy Hudgeons, Department of Entomology at Texas A&M University; Allen Knutson, research advisor.
- "A Decision Support System to Develop Sustainable Groundwater Management Policies for a Multi-County Single Aquifer System," Muthukumar Kuchanur, Department of Environmental and Civil Engineering at Texas A&M University - Kingsville; Venkatesh Uddameri, research advisor.
- "Watershed Development and Climate Change Effects on Environmental Flows and Estuarine Function," Marc Russell, Department of Natural Sciences at the University of Texas at Austin; Paul Montagna, research advisor.
- "Spatial Patterns in Wetland Nutrient Biogeochemistry: Implications for Ecosystem Functions," Thad Scott, Department of Biology at Baylor University; Robert Doyle, research advisor.
- "Carbon Aerogel Electrodes: Absorption-Desorption and Regeneration Study for Purification of Water," Sanjay Tewari, Department of Civil Engineering at Texas A&M University; Timothy Kramer, research advisor.
- "Evaluation of Spatial Hetergeneity of Watershed through HRU Concept Using SWAT," Xueson Zhang, Department of Forest Science; Raghavan Srinivasan, research advisor.

For more information on these research projects visit our Web site at http://twri.tamu.edu/usgs.php.