Evaluation & Prioritization of Erosion Control Projects at Camp Atterbury Joint Maneuver Training Center, Indiana

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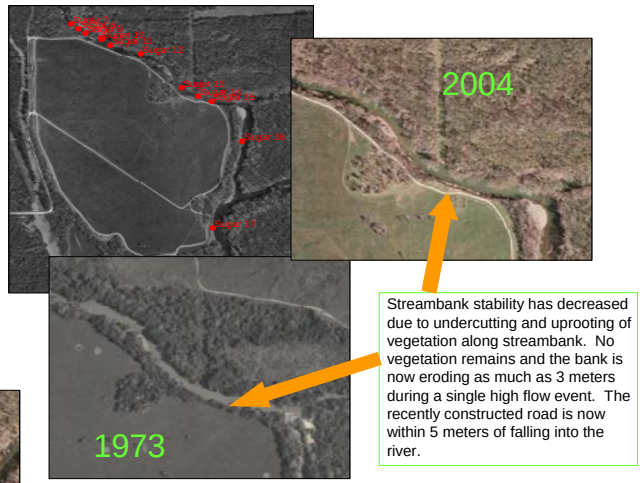
Background:

Actively eroding training lands and stream banks can be found along primary creeks and streams on Camp Atterbury Joint Maneuver Training Center (CAJMTC). Severe landscape erosion has caused stream bank degradation, increased sediment loads, decreased water quality, wildlife habitat degradation, and unsafe training areas. The assessment and prioritization of erosional areas allows CAJMTC to systematically improve their stream water quality through targeted rehabilitation efforts, while protecting their low water crossings, bridges, trails, and road systems.

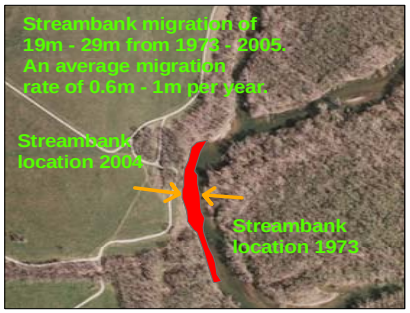
At present, the level of funding and time needed to stabilize all eroding areas is insufficient. The most logical action is to rank areas with the greatest need for rehabilitation and identify cost effective, low maintenance technologies for erosion stabilization. Sites of excessive erosion needing stabilization were ranked in order of priority based on environmental and training impacts, ease of rehabilitation, and average annual soil loss.

Remote Sensing:

Historical aerial photos were used to detect stream bank migration over time and determine active vs. inactive erosion on bare ground. Historical aerial photographs from 1974 and 1984 along with satellite imagery of CAJMTC from 1999 and 2004 were used with a geographic information system (GIS) to find evidence of erosion. All ranges were viewed from the 2004 images on ArcGIS® for a general overview. For the majority of upland sites, rill and gully erosion was visible on the 2004 satellite imagery. It should be noted that woody debris and fallen timber was mistaken for rill and gully erosion on three sites marked as possible erosion areas.



Streambank stability has decreased due to undercutting and uprooting of vegetation along streambank. No vegetation remains and the bank is now eroding as much as 3 meters during a single high flow event. The recently constructed road is now within 5 meters of falling into the river.



Streambank erosion was assumed when comparisons between images revealed significant bank migration. Preliminary site areas, perimeters, and migration rates were calculated using the polygon tool in ArcGIS®. This was possible because the 2004 image was rectified and accurate to within 1 meter. By comparing these remote sensing images most possible or known erosion sites were documented and recorded using ArcGIS®. The erosion site locations and possible hotspots found during the electronic search were used as reference for three field surveys during June, July and August 2005 and April 2006.

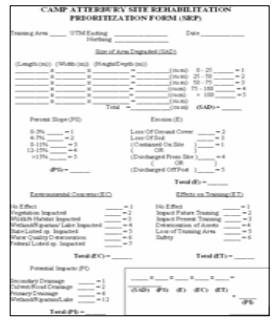
Field Surveys:

Field surveying was the main method by which the erosion site data was collected and recorded. The field visits were also necessary to validate and ground truth remote sensing survey. The first field survey effort identified streambank instability along a 4th-order stream and was preformed from the water by canoeing the length of the impacted reach. At each unstable erosion site the stream width and maximum depth was measured along with the width, height, and slope of the site itself. Soil, vegetation, and channel profile characteristics were also noted. In addition, wildlife activities and the existence of recreational canoeing were also noted.

The second and third field survey efforts focused on erosion within CAJMTC on 1st-order streams and upland erosion. The height, width, length, and slope of the erosion sites were measured. Soil type, vegetation, disturbance levels, and types of erosion were recorded. In addition, signs of recent military activity and environmental impact were noted.

Erosion Site Ranking:

The Site Rehabilitation Prioritization Form (SRPF) was developed through the Integrated Training Area Management (ITAM) Program and is intended to help prioritize land rehabilitation and maintenance of training and testing lands. The SRPF rankings are derived from a weighted system that assigns a score to each site by considering the size of the area, the percent slope, the type(s) of erosion, and the impact of the degradation on the environment and training. High scores correspond to high priority.



The Land Rehabilitation Potential Model (LRPM), developed by the U.S. Army Construction Engineering Research Laboratory (CERL), uses several ecologically based site-factors known to influence the potential for successful rehabilitation of damaged sites.

The Water Erosion Prediction Project (WEPP) model is a process-based, distributed parameter, continuous simulation, erosion prediction model. It is capable of modeling hillslope erosion processes soil loss and sediment deposition from flow in small channels, and sediment deposition in impoundments.

Conclusion:

The erosion sites across the installation were ranked using SRPF, LRMP, and WEPP. Average ranking from the three methods were then found and used to create a final average ranking of every site. The site-specific rankings were used to determine top priority areas of impact.

The assessment detailed above ranked eroding training sites/ranges at CAJMTC based primarily on environmental degradation, potential for successful rehabilitation of damaged sites, and annual soil erosion estimates. The final ranking provided CAJMTC's ITAM office with an installation-wide snap shot in time of the state of active erosion impacting training lands. This ranked list of sites provided useful information of where erosion was taking place. It also provided data for sites that were most in need of repair and had high potential for successful rehabilitation. The assessment, however, provided no information with regard to the estimated costs of repairing these sites and it failed to recommend preventative measures to limit future training range degradation at CAJMTC.