

Riparian Ecosystem Management at Military Installations: Determination of Impacts and Restoration and Enhancement Strategies

Background:

The U.S. Department of Defense (DoD) recognizes the critical importance of riparian ecosystems as habitat and as controls on adjacent aquatic ecosystems, including maintenance of water quality of streams and rivers draining military installations. Riparian ecosystems at many military installations are stressed to an unknown degree by singular and interactive effects of training activities involving mechanized vehicles and other disruptive activities such as prescribed fires for forest management efforts to reduce fuel loads. This research is designed to evaluate these impacts on riparian ecosystems and investigate potential remediation strategies by conducting an intensive study at Fort Benning, Georgia, where riparian disturbances are significant and typical of those experienced at other military installations.

Objective:

The two major objectives of this project are to : (1) Identify the impacts of upland and riparian disturbances resulting from military training and prescribed fire to riparian ecosystem function; and (2) Evaluate two riparian restoration strategies (woody debris additions and revegetation).

Summary of Process/Technology:

Key riparian (vegetation, soil) and stream (water chemistry, metabolism, algal/macroinvertebrate communities) ecosystem properties will be compared across disturbance gradients, and before and after riparian restoration.

Phase 1 (assessment of current impacts) will be conducted in the first two years of the project. Three reference catchments and 8 disturbed catchments will be studied that cover a range of upland and direct riparian disturbances. Impacts of disturbance to riparian functions will be determined by making an extensive set of measurements in riparian and stream ecosystems and applying to these data a combination of analysis of variance (ANOVA) and regression analysis to evaluate disturbance impacts.

In Phase 2 of the project (evaluation of riparian restoration techniques), the 8 disturbed catchments selected in phase 1 will receive one of the following 4 treatments: (1) control (no restoration imposed), (2) revegetation of ephemeral channels, (3) woody debris additions to ephemeral and perennial channels, and (4) a combination of revegetation and woody debris additions to ephemeral and perennial

channels. To determine the effects of restoration, the same set of measurements used in phase 1 are continued and randomized intervention analysis (RIA) is applied. RIA involves the calculation of the difference between restored and control treatments for each specific riparian and stream measurement, paired in time, spanning the period before (2 years) and after (3.5 years) the restoration activity was imposed.



A riparian zone at Fort Benning, Georgia illustrating heavy erosion and sedimentation.

Benefit:

Results of this research will provide land managers at military installations with the information needed to make decisions, concerning training intensity and the use of prescribed fire, that more effectively protect the function of riparian ecosystems.

Accomplishments:

This is an FY 2001 New Start project.

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