USDA-CSREES 2007 National Water Quality Conference

Runoff Filtering Effectiveness of Grass-Shrub Riparian Buffers

Forested riparian buffers and vegetative filter strips are widely recommended for surface water quality improvement. However, limited research has evaluated the effectiveness and removal mechanisms of the grass-shrub riparian buffers common in the Great Plains region of the United States. The objective of this study was to evaluate sediment, phosphorous (P) and nitrogen (N) removal from surface runoff flowing through a grass-shrub buffer. Eight natural runoff events from 9 plots of varying lengths in 3 types of grass-shrub riparian buffers were sampled. The 3 types of buffers were categorized by their predominant vegetation community, which were either a naturally established mixture of grasses and forbs, planted American plum (Prunus americana) with the vegetation mixture, or plum with planted warm season grasses. Inflow and outflow were analyzed for runoff volume, total suspended solids (TSS), P and N. Runoff volume reduction was >80% in all cases. Mass removal averaged 83% for TSS, 81% for total P, and 82% for total N. There was evidence of sediment resuspension in 19 out of 22 measurements, and P resuspension or remobilization in 17 out of 22 measurements. There were not significant differences in pollutant removals (alpha < 0.05) due to vegetation type. Removal of constituent pollutants was also independent of runoff events. Strategies to maximize infiltration, such as maintaining good vegetative cover and residue, and a diversified plant community in riparian buffers should be considered in buffer design and management. This study confirms the ability of the grass-shrub riparian buffer to remove sediments and nutrients from surface runoff.

Author: Charles J. Barden
University Affliation: Kansas State University
Co-Author(s): K.R. Mankin, W.A. Geyer, and S.L. Hutchinson