Evaluation of BMP Sediment Load Reductions in Southeastern US Forest Regions Using WEPP

Surface runoff from undisturbed forested landscapes has relatively low adverse impact on water quality to receiving waters compared to runoff from agriculture or urban land use. However, during forest operations such as clearcutting and road construction stream sediment concentrations increase, deteriorating water quality and reducing the storage capacity of downstream reservoirs. The objective of this study is to use the Water Erosion Prediction Project (WEPP) model to estimate percent sediment load reductions in southeastern US forest regions using selected BMPs. Clearcut operations are simulated with and without Streamside Management Zones (SMZs). Six Major Land Resource Area (MLRA) regions are selected across the southeastern US. Five-year sediment yield simulations on a modeled hillslope were performed using CLIGEN (a stochastic weather generator), forest soil series, and three forested surface management files. Modeling simulations were performed in each region using (i) undisturbed forest, (ii) clearcut with and without an SMZ (iii) thinning with and without SMZ. To model clearcuts, rotation files were developed to emulate 50 recurring harvest operations for each site under different weather conditions. Simulation results indicated a range of sediment load reductions from 9 to 27 percent for clearcuts using SMZs. In simulated thinned stands, little or no sediment yield reduction was observed with an SMZ. Average sediment yield from clearcuts was approximately twice that of comparable thinned stands. Thus, modeling results indicate that thinning itself is a BMP. Modeling simulations of forest roads with and without BMPs were conducted in five MLRA regions. BMPs included water structures diverting to an SMZ and an improved gravel road surface across a stream. Forest road simulations utilized five sites to represent prevailing regional state guidelines for water diversion on forest roads. Forest road water structures resulted in sediment yield reductions from 42 to 55 percent. When gravel road crossings were added, comparable sediment yield reductions were 61 to 84 percent.

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