

RIPARIAN SEDIMENT DELIVERY RATIO: STIFF DIAGRAMS AND ARTIFICIAL NEURAL NETWORKS

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Abstract. Various methods are used to estimate sediment transport through riparian buffers and grass filters with the sediment delivery ratio having been the most widely applied. The U.S. Forest Service developed a sediment delivery ratio using the stiff diagram and a logistic curve to integrate some of the factors influencing sediment delivery heuristically. This study independently tested the Forest Service sediment delivery ratio contrasted with artificial neural networks to represent the multiple nonlinearities between important factors and sediment delivery. The Forest Service sediment delivery ratio was not adequate when compared to published sediment yields from 30 small experimental buffers from three countries, including four forested buffers. However, artificial neural networks gave estimates of the delivery ratio that were highly correlated to the observations. The 30 buffer observations produced such good estimates of the sediment delivery ratio with both seven and five buffer parameters that this study suggests that as few as 30 sediment yield observations can be the basis for applying neural networks to interpolate the complex, multiple nonlinearities of hydrology and sediment transport on riparian buffers.

Keywords. Sediment yield, Sediment delivery ratio, Erosion, Deposition, Riparian buffers, Grass filters, Filter strips, Stiff diagram, Logistic function, and Artificial neural network.