

Overbank Sedimentation due to Beaver Activity in Mountain Landscapes

Cherie J. Westbrook^{1*}, David J. Cooper¹, and Bruce W. Baker²

¹Department of Forest, Rangeland, and Watershed Stewardship
Graduate Degree Program in Ecology
Colorado State University, Fort Collins, CO, USA 80523-1470

²U.S. Geological Survey
USGS Fort Collins Science Center
2150 Centre Avenue, Bldg C
Fort Collins, CO, USA 80526-8118

Abstract

Overbank sedimentation via vertical accretion on river riparian zones is important in landform development. The transport of sediment and its associated nutrients from rivers to riparian zones have been emphasized in the geomorphological literature during floods, however, little attention has been paid to the importance of beaver (*Castor canadensis*) in controlling sediment and nutrient deposition in riparian zones. This study examines the effect of beaver on patterns of sediment deposition and associated nutrient sequestration within a small area of the Colorado River floodplain, in Rocky Mountain National Park, Colorado. Comparing flownets with and without a 2 m tall beaver dam confirms that the dam causes river water to be diverted out of the channel and onto the valley floor, inundating or saturating approximately 15 ha. Of this, a 4.3 ha zone affected by the beaver dam was gridded into 10 by 10 m cells, and a 1 by 1 m plot was chosen randomly within each of the cells. Sediment was present at 112 of the 432 plots, and its average depth (6.0 cm) was determined in August 2003 using a hand-held soil auger. The 1.27 ha sediment plume ($\sim 750 \text{ m}^3$) was restricted mainly to west side of river where there was a steeper hydraulic gradient (-0.02) between the river and valley floor. The east side of the river, while inundated, experienced little sediment deposition, probably because there was little to no hydraulic gradient. This suggests that the water was not moving fast enough to transport any sediment. The C/N ratio of the deposited sediment was generally < 25 , suggesting a promotion of net N production in this newly created landform. The observations suggest that beaver may play an important role as a geomorphic agent capable of creating landforms in mountain landscapes.