



USDA-CSREES 2006 National Water Quality Conference

Sediment Pollution from Mass Wasting along River Banks

Sediment pollution is one of the major causes of surface water impairment. Presence of suspended sediments in rivers and lakes increases turbidity which limits light penetration and thus plant growth for aquatic organisms. Suspended sediments also directly affect the functioning of healthy aquatic organisms through its effects on gill functions and covered spawning areas. This paper discusses a study on characterization of sediment contributions from riverbanks and the underlined mechanisms for bank erosion. The study was conducted on the Blue Earth and the LeSueur Rivers, two major tributaries of the Minnesota River. Mass wasting contributions were characterized using the airborne LIDAR. Detailed topographic data were collected on 56 km length of the Blue Earth River in 2001 and 2002 with a helicopter mounted TopEye laser system. X,Y, Z coordinates of the laser returns were stripped of vegetation effects and then converted into two 1 m bare earth digital elevation models. Two models were differenced to calculate the volume change and then mass wasting between April 2001 and April 2002. Sediment loads were calculated as a percentage of transportable material in the river bank strata. For the Blue Earth River, 23% to 56% of the sediment mass transported past the gauging station was estimated as contributions from mass wasting. A subsequent experiment on an actively sloughing bank along the LeSueur River showed that differences in hydraulic properties of various river bank strata lead to pore water pressure build up which caused bank failure and thus mass wasting. Differences in hydraulic properties of bank strata were due to differences in particle size distribution of parent materials that were deposited in different glaciations. Movies and animations are used to show mass wasting processes, use of LIDAR data, and the linkage between landscape hydrology and mass wasting processes at the river's edge.

Author: Satish Gupta

Coauthor(s): Nate Bartholomew, and David Thomas