

## **An Assessment of Bank Erosion Along Mauses Creek**

Throughout the summer of 2004, Lycoming College Clean Water Institute interns hiked the full 4 miles of Mauses Creek in Danville, Pennsylvania. The interns assessed the creek from its emergence along PA route \*\*\* to its confluence with Mahoning Creek. All occurrences of erosion were documented using a form identical to the one attached. In all, 168 disturbances were observed along Mahoning Creek and are presented in Table 1 and Figure 1. Of these, 9 were bridges (5.63% of total disturbances) and 14 were pipes flowing into the creek bed (8.33% of total disturbances). There were 16 instances of rip rap (9.50% of total disturbances) along the banks and 1 ford impeding water flow (0.60% of total disturbances). There were 52 deposition bars (30.95% of total disturbances) throughout the creek bed. There were 13 tributaries (7.74% of total disturbances) observed. There were 63 instances of erosion documented along the creek (37.50% of total disturbances), 33 of which were on the right banks (52.38% of total erosion sites), while 30 were on the left banks (47.62% of total erosion sites). The positions of the banks (right or left) were established while facing downstream.

The potential for bank erosion was determined by a combination of bank height, bank angle, density of roots present, and the particle size of the bank substrate. These factors are rate for High, Moderate, or Low erosion potential and rare explained further in Tables 2-16.

The 168 erosion potential sites were determined based on the following analysis:

### **Erosion Potential based on Bank Height**

Erosion potential based on bank height for total erosion sites, and right and left bank erosion sites are presented in Tables 2-4. A bank up to 6 feet high was considered to have Low erosion potential. Banks 6 to 9 feet high were considered to have Moderate erosion potential, and any bank over 9 feet high had a High erosion potential. Of the 63 banks assessed for bank height, 45 were considered to have Low potential (71.43% of total banks), 9 were Moderate (14.29% of total banks), and 9 were determined to have High erosion potential (14.29% of total banks). Of the 33 right banks, 20 were Low (60.61% of total right banks), 5 were Moderate (15.15% of total right banks), and 8 were of High erosion potential (24.24% of total right banks). Of the 30 left banks, 25 were Low (83.33% of total left banks), 4 were Moderate (13.33% of total left banks), and 1 was of High erosion potential (3.33% of total left banks).

### **Erosion Potential based on Bank Angle:**

Erosion potential based on bank angle is presented in Tables 5-7. A bank with an angle up to 45 degrees is considered to have Low erosion potential. A bank from 45 to 90 degrees is considered to be of Moderate erosion potential, and an undercut bank (one over 90 degrees) is considered to have High erosion potential. Of the 63 banks assessed, 3 were of Low erosion potential based on bank angle (4.76% of total banks), 33 were of Moderate erosion potential (52.38% of total banks), and 27 were of High erosion potential (42.86% of total banks). On the right banks, 1 of the 33 banks assessed was of Low erosion potential (3.03% of total right banks), 18 were of Moderate erosion potential (54.55% of total right banks), and 14 were of High erosion potential (42.42% of total right banks). On the left banks, 2 of the 30 banks assessed were of Low erosion potential (6.67% of total left banks), 15 were of Moderate erosion potential (50.00% of total left banks), and 13 were of High erosion potential (43.33% of total left banks).

### **Erosion Potential based on Root Density:**

Erosion potential based on the root density of the bank is presented in Tables 8-10. A bank of Low erosion potential is one at least 60% covered by vegetation. A bank of Moderate erosion potential is one with 30% to 60% of vegetative cover, while a bank less than 30% covered by vegetation is of High erosion potential. There was 1 of the 63 total banks assessed that was considered to have Low erosion potential (1.59% of total banks), 38 of the total were of Moderate erosion potential (60.32% of total

banks), and 24 of the total were of High erosion potential (38.10% of total banks). On the right banks, 1 of the 33 was of Low erosion potential (3.03% of total right banks), 21 were of Moderate erosion potential (63.64% of total right banks), and 11 were of High erosion potential (33.33% of total right banks). On the left banks, there were no Low erosion potential areas. Of the 30 left banks assessed, 17 were of Moderate erosion potential (56.67% of total left banks), and 13 were of High erosion potential (43.33% of total left banks).

### Erosion Potential based on Particle Size:

Erosion potential based on the particle size of the bank substrate is presented in Tables 11-13. Banks composed mainly of bedrock or boulders are considered to have Low erosion potential. Banks made up of basketball-sized rocks to pebbles are considered to have Moderate erosion potential, while banks made of sand or clay have High erosion potential. Of the 63 banks assessed, there were no Low erosion potential areas, 20 were of Moderate erosion potential (31.75% of total banks), and 43 were of High erosion potential (68.25% of total banks). On the right banks, 10 were of Moderate erosion potential (30.30% of total right banks), and 23 were of High erosion potential (69.70% of total right banks). On the left banks, 10 were of Moderate erosion potential (33.33% of total left banks), and 20 were of High erosion potential (66.67% of total left banks).

### Erosion potential based on Length of Site as Compared to Bank Height:

Erosion potential based on the length of each site as compared to the height is present in Tables 14-16. The sites were divided into Low, Moderate, and High erosion potential based on bank height and then classified into the following categories: 0-50 feet in length, 51-100 feet in length, 101-250 feet in length, 251-500 feet in length, and 501-1000 feet in length. There were 13 erosion potential areas that were 0-50 feet in length (20.63% of total banks). Of these 13 banks, 8 had Low erosion potential based on bank height, 2 had Moderate erosion potential, and 3 had High erosion potential. There were 33 erosion potential areas that were 51-100 feet in length (52.38% of total banks). Of these 33 banks, 22 had Low erosion potential based on bank height, 6 had Moderate erosion potential, and 5 had High erosion potential. There were 17 erosion potential areas that were 101-250 feet in length (26.98% of total banks). Of these 17 banks, 15 had Low erosion potential, 1 had Moderate erosion potential, and 1 had High erosion potential. There were no erosion potential areas 251-500 feet and 501-1000 feet long observed. Of the 13 erosion potential areas 0-50 feet in length, 8 were found on the right bank (24.24% of total right banks). Of these 8 banks, 4 had Low erosion potential based on bank height, 1 was Moderate, and 3 were High. There were 5 erosion potential areas 0-50 feet in length found on the left bank (16.67% of total left banks). Of the 5 areas, 4 were Low erosion potential based on bank height and 1 was Moderate. Of the 33 erosion potential areas 51-100 feet in length, 18 were found on the right bank (54.54% of total right banks). Of these 18 areas, 9 had Low erosion potential, 4 were Moderate, and 5 were High. There were 15 erosion potential areas 51-100 feet in length found on the left bank (50.00% of total left banks). Of the 15 areas, 13 had Low erosion potential and 2 were Moderate. Of the 17 erosion potential areas 101-250 feet in length, 7 were found on the right bank (21.21% of total right banks). All 7 of these areas had Low erosion potential. There were 10 erosion potential areas 101-250 feet in length found on the left bank (33.33% of total left banks). Of the 10 areas, 8 had Low erosion potential, 1 was Moderate, and 1 was High.

### Conclusion

There were four sites (sites 48, 60, 65, and 100) that showed evidence for a high probability of erosion. Site 48 had high erosion potential for bank height, bank angle, root density, and particle size. Site 60 had moderate erosion potential for bank height and high erosion potential for bank angle, root density, and particle size. Site 65 had moderate erosion potential for bank angle and high erosion potential for bank height, root density, and particle size. Site 100 had moderate erosion potential for root density and high erosion potential for bank height, bank angle, and particle size.