

An Assessment of Bank Erosion Along Kase Run

Throughout the summer of 2004, Lycoming College Clean Water Institute interns hiked the full 3 miles of Kase Run near Danville, Pennsylvania. The interns assessed the creek from its emergence near Interstate 80 to its confluence with Mahoning Creek. All occurrences of erosion were documented using a form identical to the one found in the appendix. In all, 78 disturbances were observed along Indian Creek and are presented in Table 1 and Figure 1. Of these, 3 were bridges (3.85% of total disturbances) and 3 were pipes flowing into the creek bed (3.85% of total disturbances). There were 2 instances of rip rap (2.56% of total disturbances) along the banks and 1 dam impeding water flow (1.28% of total disturbances). There were 24 deposition bars (17.24% of total disturbances) throughout the creek bed. There was 1 area (1.28% of total disturbances) consisting of a ford where motor vehicles were driving through the creek. There were 8 tributaries (10.26% of total disturbances) observed. There were 34 instances of erosion documented along the creek (43.59% of total disturbances), 17 of which were on the right banks (50.00% of total erosion sites), while 17 were on the left banks (50.00% 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 rated for High, Moderate, or Low erosion potential and are explained further in Tables 2-16.

The 24 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. All 34 banks assessed according to bank height were found to have low erosion potential (100% of all 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 34 banks assessed, 6 were of Low erosion potential based on bank angle (5.88% of total banks), 12 were of Moderate erosion potential (35.29% of total banks), and 16 were of High erosion potential (47.06% of total banks). On the right banks, 3 of the 17 banks assessed were of Low erosion potential (17.65% of total right banks), 7 were of Moderate erosion potential (41.18% of total right banks), and 7 were of High erosion potential (41.18% of total right banks). On the left banks, 3 of the 17 banks assessed were of Low erosion potential (17.65% of total left banks), 5 were of Moderate erosion potential (29.41% of total left banks) and 9 were of High erosion potential (52.94% 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 34 total banks assessed that were considered to have Low erosion potential (2.94% of total banks), 22 of the total were of Moderate erosion potential (64.71% of total banks), and 11 of the total were of High erosion potential (32.35% of total banks). On the right banks, 10 were of Moderate erosion potential (58.82% of total right banks), and 7 were of High erosion potential (41.18% of total right banks). On the left banks, 1 of the 17 was of Low erosion potential (5.88% of total

left banks), 12 were of Moderate erosion potential (70.59% of total left banks), and 4 were of High erosion potential (23.53% 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 34 banks assessed, 0 were of Low erosion potential (0% of total banks), 9 were of Moderate erosion potential (26.47% of total banks), and 25 were of High erosion potential (73.53% of total banks). On the right banks, 3 were of Moderate erosion potential (17.65% of total right banks), and 14 were of High erosion potential (82.35% of total right banks). On the left banks, 6 with Moderate erosion potential (35.29% of total left banks), and 11 with High erosion potential (64.71% 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. All banks assessed were of Low erosion potential. There were 8 erosion potential areas that were 0-50 feet in length (23.53% of total banks), 15 were 51-100 feet in length (44.12% of total banks), 9 were 101-250 feet in length (26.47% of total banks), and 2 were 251-500 feet in length. There were no erosion potential areas observed to be greater than 500 feet in length. Of the 8 erosion potential areas 0-50 feet in length, 4 were found on the right bank (23.53% of total right banks) and 4 on the left bank (23.53% of total left banks). Of the 15 erosion potential areas 51-100 feet in length, 7 were found on the right bank (41.18% of total right banks) and 8 were on the left bank (47.06% of total left banks). Of the 9 erosion potential areas 101-250 feet in length, 5 were found on the right bank (29.41% of total right banks) and 4 were on the left bank (23.53% of total left banks). Of the 2 erosion potential areas 251-500 feet in length, 1 was on the right bank (5.88% of total right banks) and 1 was on the left bank (5.88% of total left banks).

Conclusion

There were two sites, sites 35 and 53, that showed evidence for a high probability of erosion. Both sites had low erosion potential for bank height and high erosion potential for bank angle, particle size, and root density.

Structures	Amount	Percentage out of 78 sites
Bridges	3	3.85%
Ford	1	1.28%
Depositions Bars	24	30.77%
Pipes	3	3.85%
Rip Rap	2	2.56%
Tributaries	8	10.26%
Dam	1	1.28%
Total Erosion sites	34	43.59%
Right Banks	17	50.00%
Left Banks	17	50.00%

Table 1. Summary of disturbances along Kase Run.

Figure 1. Summary of disturbances along Kase Run.

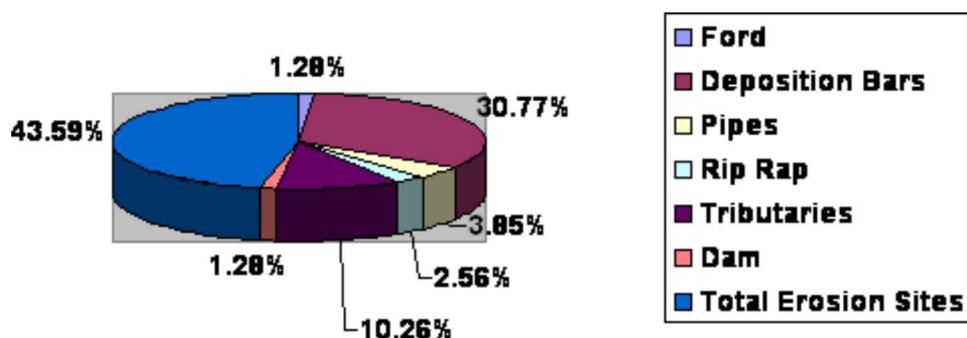


Table 2. Bank height of all erosion sites along Kase Run.

Bank Height	Number	Percent
Low	34	100%
Moderate	0	0%
High	0	0%
Total	34	

Table 3. Bank height of right bank erosion sites along Kase Run.

Height	Number	Percent
Low	17	100%
Moderate	0	0%
High	0	0%
Total	17	

Table 4. Bank height of left bank erosion sites along Kase Run.

Left Banks		
Height	Number	Percent
Low	17	100%
Moderate	0	0%
High	0	0%
Total	17	

Table 5. Bank angle of all erosion sites along Kase Run.

Bank Angle	Number	Percent
Low	6	5.88%
Moderate	12	35.29%
High	16	47.06%
Total	34	

Table 6. Bank angle of right bank erosion sites along Kase Run.

Bank Angle	Number	Percent
Low	3	17.65%

Moderate	7	41.18%
High	7	41.18%
Total	17	

Table 7. Bank angle of left bank erosion sites along Kase Run.

Height	Number	Percent
Low	3	17.65%
Moderate	5	29.41%
High	9	52.94%
Total	17	

Table 8. Root density of all erosion sites along Kase Run.

Root Density	Number	Percent
Low	1	2.94%
Moderate	22	64.71%
High	11	32.35%
Total	34	

Table 9. Root density of right bank erosion sites along Kase Run.

Right Banks		
Root Density	Number	Percent
Low	0	0%
Moderate	10	58.82%
High	7	41.18%
Total	17	

Table 10. Root density of left bank erosion sites along Kase Run.

Root Density	Number	Percent
Low	1	5.88%
Moderate	12	70.59%
High	4	23.53%
Total	17	

Table 11. Particle size of all erosion sites along Kase Run.

Particle Size	Number	Percent
Low	0	0%
Moderate	9	26.47%
High	25	73.53%
Total	34	

Table 12. Particle size of right bank erosion sites along Kase Run.

Particle Size	Number	Percent
Low	0	0%
Moderate	3	17.65%
High	14	82.35%

Total	17	
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Table 13. Particle size of left bank erosion sites along Kase Run.

Particle Size	Number	Percent
Low	0	0%
Moderate	6	35.29%
High	11	64.71%
Total	17	

Table 14. Length of erosion sites compared to bank height along Kase Run.

Length in feet	0-50	51-100	101-250	251-500	501-1000
Low Bank Height	8	15	9	2	0
Moderate Bank Height	0	0	0	0	0
High Bank Height	0	0	0	0	0
Total	8	15	9	2	0
Percent out of 24	23.53%	44.12%	26.47%	5.88%	

Table 15. Length of right bank erosion sites compared to bank height along Kase Run.

Length in feet	0-50	51-100	101-250	251-500	501-1000
Low Bank Height	4	7	5	1	0
Moderate Bank Height	0	0	0	0	0
High Bank Height	0	0	0	0	0
Total	4	7	5	1	0
Percent out of 11	23.53%	41.18%	29.41%	5.88%	

Table 16. Length of left bank erosion sites compared to bank height along Kase Run.

Length in feet	0-50	51-100	101-250	251-500	501-1000
Low Bank Height	4	8	4	1	0
Moderate Bank Height	0	0	0	0	0
High Bank Height	0	0	0	0	0
Total	4	8	4	1	0
Percent out of 13	23.53%	47.06%	23.53%	5.88%	