

Comparing the floodplain hydrology of a recently restored stream bank to a natural, undisturbed, floodplain

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The scientific community has been turning their focus to the watershed level when tackling sediment and pollution related issues. This paradigm shift has increased the number and size of the stream restoration projects that have been accomplished. However, there is a lack of data and inadequate attention given to the effectiveness of these restoration efforts.

In December 2015, an eroded reach of Parkerson Mill Creek was restored. The stream bank degradation only took place on one side of the floodplain while the other side remained functional. Hence, the stream restoration was directed at only the degraded side. This reach now offers the unique opportunity to study the hydrology of a recently restored floodplain compared to a natural reference floodplain within the same reach.

To assess the hydrology of the restored and natural sides of the floodplain, we developed a groundwater-sampling plan in which four groundwater wells, evenly spaced at intervals of 20 feet, were established along a perpendicular transect within each floodplain. Each groundwater well was equipped with a groundwater-level sensor. The goal was to understand how rainfall, discharge volumes, and groundwater levels are interconnected and how groundwater levels differ between a recently restored floodplain (left floodplain) and a natural, reference floodplain (right floodplain).

Results showed that groundwater moved more swiftly through the disturbed (restored) side of the reach due to a lack of established horizons within the soil profile. This result was predicted since this soil had been completely disrupted and had not been through the same weathering processes as the established, non-disturbed, bank of the stream. However, we noted that the restored floodplain has established vegetation and has been stable despite multiple storm events that have filled the stream to overflowing.

Future restoration efforts should be pursued well after the initial work has been completed to understand better the healing process that a floodplain undergoes after being completely disturbed. Although traditionally limited by budget, these follow-up studies are needed to gain a full understanding of what is truly accomplished by a restoration effort.

Statement of Research Advisor:

Ben has worked on this project very independently and he had to deal with situational factors that he could not influence but that affected his work. Yet he invested time and effort to mitigate unforeseeable issues, for example, like how to dig wells to appropriate depths. I think he has had a great experience of planning, conducting, analyzing, reporting, and presenting field research. Through Ben's research, we have now a better understanding of the hydrology of restored stream reaches vs. reference conditions.

—Thorsten Knappenberger, Crop, Soils and Environmental Sciences