Abstracts

Wednesday, April 30

Session H6: Monitoring the Effectiveness of Stream Restoration

1:30 – 3:00 pm | Room 232

Water Quality Benefits of Stream Reclamation – Cherry Creek Basin, Colorado

Craig Wolf
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Abstract
Stream bank erosion is a natural part of a dynamic alluvial stream channel; however, when the stream is located in an urban setting, the increased impervious landscape often accelerates the rate of runoff and stream bank erosion. As a result, sediment and other pollutant loads increase in the stream and settle out in detention basins or reservoirs further downstream reducing water quality. Stream reclamation has been extensively used throughout the country to protect and enhance water quality, although quantifying the benefits has received little attention. The Cherry Creek Basin Water Quality Authority has long recognized stream stabilization/reclamation as an effective management tool, and in 2007, the Authority completed the Cottonwood Creek Reclamation project that reclaimed 2.3 miles of stream reach. Since the completion of the Cottonwood Creek Stream Reclamation, the flow weighted total phosphorus concentration has been reduced from a pre-project average of 143 µg/L to a post-project average of 79 µg/L, approximately a 45 % reduction. Similar reductions in phosphorus concentrations have been observed downstream of the reclamation reach on McMurdo Gulch, a tributary to Cherry Creek. In 2013, the Authority expanded stream reclamation to Cherry Creek as a management strategy to improve water quality conditions. By evaluating the effectiveness of stream reclamation on a cost-per-pound of phosphorus basis, the Authority can select the most cost effective project for implementing their nutrient reduction management strategies throughout the Cherry Creek Basin.

Bloomington's EPA National Monitoring Project Found Significant Water Quality Improvement with Nutrient Reduction and Enhanced Biotic Response with the Restoration of a Prairie Stream/Slough

Don Roseboom[1], Amy Walkenbach[2] and Tim Straub[1]
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Abstract
The U.S. Environmental Protection Agency National Non-Point Pollution Monitoring Project is located at The Grove housing development near Bloomington, Illinois. The City of Bloomington restored Kickapoo Creek to a more natural state by incorporating green infrastructure – specifically flood-plain reconnection, riparian wetlands, meanders, and rock riffles – at a 90-acre park within The Grove residential development. The Grove Park receives the agricultural runoff from 9,000 acres of farmlands.

A team of State and Federal agencies staff with consultants continue to collect environmental data to monitor the effectiveness of this stream restoration in improving water-quality and stream habitat under the precipitation extremes of flood and drought.

The water quality improvements from nutrient reduction by instream during normal stream flows are demonstrated by a 24 percent reduction in nitrate concentration and nitrate load in 2013. Stream fisheries also increased by 50 percent per year until the extreme Midwest drought of 2012.

The placement of fixed nitrate probes at three U.S. Geological Survey (USGS) stream gaging stations and a portable nitrate probe allowed the determination of agricultural watershed processes that create the largest nitrate loading during major floods.

The Grove watershed lies in the Illinois River Basin which underwent record flooding in the last two weeks of April, 2013. This record flooding is typical of the agricultural floods which creates hypoxia in the Gulf of Mexico near New Orleans. Surface water runoff from agricultural waterways created the greatest nitrate loading at the peak flood flows on April 18th, 2013. While the tile nitrates concentrations were greater (20 mg/l) than the waterway surface runoff nitrate concentrations (11.8 mg/L), the waterway had much greater flow rates.

Stream nitrate loadings and sediment loadings increased with runoff from crop fields – peaking as floodwaters peaked when surface waters dominated the stream flow. Although the flood peak discharges and sediment of large floods overflow into wetlands during the rising limb, the smaller channel forming flood discharges passes much of the sediment load downstream.

The sediment transport capacity is determined by both standard USGS sediment gaging technology with multiple flood samples and by the recently developed technology based on the strength of the sonar return signals during acoustic flow measurement and continuous turbidity measurements. This approach allows a more natural stream and riparian form in both residential and agricultural watersheds – more natural streams in very non-natural watersheds.

Both sediment and nitrate monitoring has been enhanced by the continuing development of new USGS technologies, which allow real time monitoring of Illinois stream water quality at the Illinois EPA and USGS websites.

Watershed Restoration Using In-Stream Lime Dosing for Treating Acid Mine Drainage

Sheila Vukovich
West Virginia Dept. of Environmental Protection, Bridgeport, W.Va.

Abstract
Passive at-source acid mine drainage (AMD) treatment systems have been constructed by the West Virginia Abandoned Mine Lands and Reclamation (WV AML) Program since 1980. Numerous variations of at-source treatment systems ranging from simple limestone channels to combinations of anoxic limestone drains, successive alkaline producing systems, and wetlands were constructed with the intent of effectively treating AMD. While the majority of these systems initially improved source water quality, the quality often reverted to pre-treatment conditions after just a few years. Even while working, the systems did not produce watershed-wide improvements.

With more than 12,000 miles of impaired streams in West Virginia, the reclamation philosophy changed toward finding a more effective means of treating AMD to achieve watershed restoration. WV AML elected to move in a new direction and utilize in-stream lime dosing in tributaries impaired by AMD instead of treating individual AMD sources scattered throughout a watershed. Due to the severity of impairment and the number of contributing AMD sources, Three Fork Creek was selected for this pilot project. The goal of the project was to return Three Fork Creek mainstem to its designated stream usages by decreasing the water quality impairment due to multiple AMD discharges within the watershed. The objectives were to: improve water chemistry and aesthetics to support recreational water activities, and restore benthic macro-invertebrates and fish in Three Fork Creek mainstem.

Construction of four lime dosers on the most severely impaired headwater tributaries began in spring of 2011 and was completed the following spring. The dosers utilize hydrated lime (Calcium Hydroxide) or pelletized lime (Calcium Oxide). Three dosers operate on a water wheel and auger system, while the fourth operates on a tipping bucket system.

Although not aesthetically pleasing, in-stream lime dosing resulted in measurable water chemistry improvements in the “sacrificial treatment zone” downstream of each doser. Chemical and biological sampling conducted since implementing in-stream lime dosing shows the goal and objectives of restoring Three Fork Creek mainstem were achieved.

Top 5 Tips for Working on Stream Projects with Teens: Lessons from Austin Youth River Watch

Brent Lyles
Austin Youth River Watch, Austin, Tex.

Abstract
Teaching the next generation about stream restoration is something we can all feel good about, and involving them in our projects is even better. It's also true that working with teens is not as easy as it sounds! In this session, we'll give you practical tools to make your next stream- or river-related project even more successful because of teen involvement.

For the last 21 years, the high-school students in Austin Youth River Watch have monitored water quality at stream and river sites all over the Austin metro area. Data sets from these 23 sites (and counting) are submitted to and reviewed by local and statewide agencies. Our work benefits the community, and the kids are learning science -- plus, they love it. Now, in the last two years, we've begun adding stream-restoration service projects to our repertoire of student programs. We've learned some lessons the hard way, and we're here to share those lessons.

In this session, we'll talk about the benefits of working with teens, and we'll share information about Austin Youth River Watch's model. We'll give you our Top 5 Tips for working with teens, and we'll answer your questions about how to build competitive proposals in this growing field of "youth engagement."