Practice Title

Riprap or Rock Wall

Photo(s)

The most common technique for slowing streambank erosion is to protect the bank with rock riprap. In these photographs from the Schoharie Creek, rip rap is used in conjunction with sheet piling (left), partial vegetation (center) and a retaining wall (right). Ideally, vegetation would be planted throughout the projects to shade the rock and water, provide better habitats and provide long-term stability.

Summary of Practice

Riprap typically consists of large angular rocks dumped or hand placed on a streambank to protect it from the erosive power of a stream. Riprap can be extremely effective in many situations, but its use does have drawbacks. Water flowing near the riprap generally moves fast and there is often turbulence near the bank. As water hits and deflects off the riprap it gains in velocity and it is more likely to erode adjacent unprotected areas. This process of downstream effects can set up an endless process of placing riprap along the stream. Riprap also tends to require on-going maintenance to correct instances where the rock is being undermined and either peeling away from the bank, or slumping into the stream.

Riprap, or graded stone, has been used in a variety of ways to prevent streambank erosion in the United States for more than a century. Most of this work was unregulated and was executed prior to the recognition of the potential environmental impacts of such activities. Consequently, thousands of miles of stream have been stabilized with riprap, and it is clear that the nation's waters have been impacted (Fischenich, 2003).

Impact on Stream and Floodplain Processes and Functions

Functions most likely to be impacted by stabilization measures include stream evolution processes, riparian succession, sedimentation processes, habitat, and biological community interactions. Those least likely to be impacted include the functions related to hydrologic balance and chemical and biological processes. The nature and significance of the impacts depend upon the specific measure employed, and the characteristics of the stream system on which it is used (Fischenich, 2003). For detailed information see *Effects of Riprap on Riverine and Riparian Ecosystems* (http://el.erdc.usace.army.mil/wrap/pdf/trel03-4.pdf).

In general, many of the negative impacts of riprap can be lessened through the use of vegetation throughout the project, both limiting the amount of rock in the project through the use of vegetation on the top of the bank, and interplanting the riprap with vegetation. Once established, the vegetation can also provide long-term stability to the project.

Erosion in the Esopus Creek (left) and the same bank post-restoration with bank armor including a vegetation component (Vegetated Reinforced Slope Stabilization) (right). This project also included in-stream structures that aren't shown in these photos.

Impact on Your Property

Riprap may be an effective measure for temporarily slowing the erosion of your property. However, the riprap will need on-going maintenance in order to remain effective and may cause erosion on other sections of your property.

Impact on Neighbor's Property

Due to the increase in water velocity, and possible change in direction of the flow, installing riprap on your property may destabilize your neighbor's streambank. Please contact

info@catskillstreams.org to schedule a site visit from a local resource professional that can advise on the best options for your streamside.

Recommended Use

Riprap can be extremely effective in many situations, but its use does have drawbacks. Water flowing near the riprap generally moves fast and there is often turbulence near the bank. As water hits and deflects off the riprap it gains in velocity and it is more likely to erode adjacent unprotected areas. This process of downstream effects can set up an endless process of placing riprap along the stream. Riprap also tends to require on-going maintenance to correct instances where the rock is being undermined and either peeling away from the bank, or slumping into the stream. Please contact info@catskillstreams.org to schedule a site visit from a local resource professional that can advise on the best options for your streamside.

Permits Needed

In-stream work will require a DEC Article 15 Stream Disturbance Permit. An ACOE permit is required when more than 25 cubic yards of fill material will be used below the "ordinary high water mark" (the approximate yearly flood level); the DEC can advise you about determining these limits.

Resources (Links, Articles, etc.)

http://el.erdc.usace.army.mil/wrap/pdf/trel03-4.pdf

Text Sources

Fischenich, C.J. 2003. Effects of Riprap on Riverine and Riparian Ecosystems. Environmental Laboratory, U.S. Army Engineer Research and Development Center, Vicksburg, MS. Available on web: http://el.erdc.usace.army.mil/wrap/pdf/trel03-4.pdf.

Thigpen, Janet. 2006. Stream Processes: A Guide to Living In Harmony with Streams. Chemung County Soil & Water Conservation District. Available of web: http://www.chemungcountyswcd.com/homepage.html.

Photo Sources

Mark Watts, Chemung County Soil and Water Conservation District

Steuben County Soil and Water Conservation District

New York City Department of Environmental Protection

Greene County Soil and Water Conservation District