CASE STUDY: ESOPUS MEADOWS PRESERVE & WATER TRAIL SITE

OVERVIEW

An existing degraded building, shoreline armoring, and impervious surfaces were removed and replaced with an erosion resistant shoreline that has natural features which have improved habitat and recreational access.

LOCATION & ACCESS

This Scenic Hudson property is located in the Town of Esopus, New York, located on Brookside Drive off County Route 24/River Road. This site is reached by water as part of the Greenway Water Trail located on the west side of the Hudson at river mile 86.5.

PARTICIPANTS

Owner: The Scenic Hudson Land Trust, Inc.
Manager: Scenic Hudson
Design: Creative Habitat Corp. & Scenic Hudson
Contractor: T.J.R., Inc.
Cost: $230,753
Grants: Hudson River Estuary Grant Program Project ($75,000), Hudson River Greenway Water Trail Grant ($18,000), and Hudson River Improvement Fund ($5,000)
Timeframe: 2004-2006

HUDSON RIVER SUSTAINABLE SHORELINES

The Hudson River Sustainable Shorelines Project is a multi-year effort lead by the New York State Department of Environmental Conservation Hudson River National Estuarine Research Reserve, in cooperation with the Greenway Conservancy for the Hudson River Valley.

The Project is supported by NOAA through the National Estuarine Research Reserve System Science Collaborative.

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BACKGROUND AND STORY

Esopus Meadows is one of the largest tidal flats in the Hudson River estuary. It has been used throughout history by local Native Americans to fish and by local farmers to graze their cows at low tide on the water celery. Today, Esopus Meadows is one of the most scenic reaches of the Hudson River as well as a very productive fish nursery for shad, perch, and striped bass.

Scenic Hudson acquired the parcel adjacent to Esopus Meadows tidal flats in 1996, and in 2003, the organization sought to create a water trail stop for non-motorized boat users to access the Esopus Meadows property. At the time, the existing shoreline consisted of a brick building protected by a failing bulkhead that was damaging shoreline habitats, interrupting sediment processes, and limiting access for paddlers. Scenic Hudson sought to remove these impediments to human access and restore natural shoreline attributes.

ASSESSMENT, PLANNING & DESIGN

In order to make the shoreline as natural as possible, Scenic Hudson proposed to remove the degrading bulkhead, as well as the nearby building, and stabilize the shore with softer alternatives that would still provide shoreline protection. In addition to making the area more ecologically enhanced and aesthetically pleasing, Scenic Hudson also sought a design that would enable paddlers to easily stop and enjoy the site. Esopus Meadows is now one of many stops along the Hudson River Greenway Water Trail.

The Creative Habitat Corp. landscape designer proposed a stone toe to be placed at the high tide line. Above the stone toe, soft gabions would be used to help hold the soil in place and an array of vegetation would be planted in between to provide support.

Figure 1: Previous bulkhead and house in 2002.

Figure 2: Boat launch and new embankment nearly complete in August 2006.

PLAN IMPLEMENTATION & DESIGN

In 2006, demolition of the bulkhead and deteriorating building began, followed by re-grading and installation of the stone toe and soft gabions and planting of the shrubs. The stone toe was placed at the high tide level for spring tides, which occur at the new and full moon. Soft gabions use a geotextile to wrap soil and rock, in order to rebuild and stabilize the slope. In this case, the geotextile was an erosion control mat of woven bristle coir which is made from coconut husks. This completely biodegradable material is wildlife friendly as it does not ensnare animals such as snakes, birds, and fish. A mixture of native shrub species was planted between the soft gabions. These included dogwood, chokeberry, American elderberry, and arrowwood. These species, in particular, were selected because of their resistance to beaver and muskrat - two common herbivores in the area. Using a variety of different species reduces the risk for a complete die off or dieback of vegetation due to natural forces, animals, human disturbances, or disease. The project was completed in September 2006. Approximately 125 feet of hard shoreline was replaced with a more natural shoreline.

Figure 3: Soft gabions installed in May 2006.

Figure 4: Live stakes and erosion control mats used to repair damage following a storm in April 2007.

Unfortunately, within a year of completing the project, a strong Nor'easter in April 2007 damaged some of the soft shoreline. Because the large storm occurred so shortly after installation, plantings were not yet thoroughly established and were unable to hold the embankment in place. However, the natural bedrock outcrop protected some plants in the northern section of the embankment. About 5/6 of the soft gabion collapsed and slumped downward. As a result, the slumping fabric created a gentler shoreline incline. Scenic Hudson restored the damaged area and replaced the fabric. Rather than bringing in a crew to reset the initial slope of the shoreline, the repair was accomplished by draping the erosion control fabric over the soil and using live stakes[1] to secure it. The original soft gabion featured 14 different plant species for variety. All were planted as fully developed plants. Few of these plants were lost due to the storm, but

[1] Live stakes are ½"to 3" diameter stakes made from branches of tree species which easily and quickly propagate. Commonly used species are dogwood, viburnum, and willow. The stakes are driven into the embankment where the roots grow and bind the soil to prevent erosion.

they slid down-slope and came to rest on the boulder toe. To achieve fast establishment of new shrubs on the damaged slope, readily available ½" to ¾" dormant cuttings of silky dogwood were used as live stakes after the surface of the slope was first secured with a fully biodegradable coir erosion control mat of the needle-punch type. Fortunately, the other shrub species originally planted have successfully grown through the new gabion since the storm in 2007. In the years following, the vegetation had time to become sufficiently established and sturdy enough to hold the embankment during the tropical storms Irene, Lee, and Hurricane Sandy in 2011 and 2012, see figures below, as well as the usual physical forces of ice, waves, and currents.

Figure 5: Well-established embankment and healthy vegetative growth accomplished by spring 2012.

Figure 6: Despite a wrack line 7 feet above the mean high tide, the shoreline survived Hurricane Sandy with no damage.

LESSONS LEARNED

- It takes time for plants to become established so temporary protection may be needed, such as temporary fences or wave breaking structures.
- Monitoring and maintenance is required for 3-5 years until vegetation is firmly established.
- The resilience of the shorelines is derived from proper site assessment and subsequent grading, site specific species selection, species diversity, and site specific defenses, such as wave breaks, stone toe, and temporary fences.

Photos and information in this case study courtesy of the Hudson River Estuary Program, Creative Habitat Corp, & Scenic Hudson.