CASE STUDY

Use green engineering techniques instead of hard bank protection

Project Summary

Title: Coir roll revetment at Bedlam Bridge
Location: Bedlam Bridge, March, Cambridgeshire, England
Technique: Coir roll revetment installation; bank re-profiling
Cost of technique: ££
Overall cost of scheme: ££
Benefits: £££
Dates: January 2009

Mitigation Measure(s)

Use green engineering techniques instead of hard bank protection
Retain and improve existing water's edge and bankside habitats in modified watercourses
Preserve and improve water's edge and bank side habitats

How it was delivered

Delivered by: Middle Level Commissioners
Partners: Biffaward, funding organisation for the Middle Level Water Vole Support Project.

An eroded and undercut bank exposing bare earth at the water margin was restored using coir rolls pre-established with native water plants to create a naturally regenerating revetment and to restore water vole habitat.

Undercutting erosion caused by wave erosion and discharge from adjacent pumping station outfall

September 2009, seven months after installation, lesser pond sedge and purple loosestrife have developed strongly.

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Background / Issues

The Sixrteen Foot Drain is a low energy system with a small underwater marginal shelf (0.5 to 1 m deep, 0.5 to 1.5 m wide) quickly shelving to deeper water (circa 2 to 3 m). The substrate is predominately comprised of clay or clay/silt, although there are riverine gravels locally. The banks are predominately local topsoil and excavated clay silt with a clay core.

The main issues at the site include erosion from an adjacent pumping station outfall created undercutting of the bank at the waterline and additional wave erosion from boat wash, in places up to 1m back from the original margin. The erosion also prevented water voles from establishing their burrows and entry points to the channel due to the undercut and the absence of any marginal shelves. In addition, the undercutting erosion led to bank slippages.

The traditional repair method would have used hard revetment materials such as steel piles or wooden posts and toe boards reinforced with stone. Instead, as part of the Middle Levels Water Vole Support Project, a method more sympathetic to the overall ecology of the channel and the habitat requirements of water voles was proposed at the site.

Aerial view of approximate area of works
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Step-by-step

The coir roll revetment project at Bedlam Bridge involved the following key elements:

- The undercut bank toe was pulled back approximately 1.5 m to create a ledge for the coir rolls to be laid on just above winter water level, which is about 0.25 m below summer water level (1 and 2). The rolls are half submerged during the summer growing period;
- The coir rolls were initially positioned on the ledge and secured with timber stakes approximately 1.5 m in length pushed in on either side with an excavator bucket. (3) The second inner row of posts were not required at future sites as it was found that they could be pinned against the bank with a single row of posts on the drain side. Future work was adapted to follow this second methodology;
- The coir rolls were held in a wide mesh and pre-established with a mix of native emergent plants (4).

1

2

3

4

Benefits

- Bank erosion eliminated.
- Natural protective revetment established.
- Water vole habitat re-created.
- Pollen-rich plants attractive to insects established, especially purple loosestrife.
- Aesthetically attractive riparian margin created.
- Emergent vegetation contributes to improvement in water quality via nutrient stripping.

Lessons Learnt

- Pre-planted coir rolls are a viable alternative to hard revetment methods if erosion areas are addressed early. A total of 1,267 m of coir rolls have been installed at 21 locations in the Middle Level system between 2009 and 2013 and the method has become an established 'stitch in time' method for Operations Engineers.
- Costs are less than hard revetment materials, especially when longer sections of bank protection are required.
- Pre-established coir rolls provide an instant 'beachhead' that allows a naturally regenerating vegetation revetment to become established.
- Fresh willow faggots should not be used as a base for the coir rolls, a method trialled at another site. If they get their tips above water the willows set root and have to be controlled to prevent trees becoming established and presenting future management problems.
- Public appreciation of the varied bank edge vegetation is very positive, especially when established in villages and amenity areas.

April 2009, three months after installation, yellow flag is the first plant to develop. Summer water level is now nearly covering the coir rolls.

August 2011, new vegetation, branched bur-reed, has become established in front of the coir rolls ensuring the revetment process are naturally regenerating.

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