



## Bank Protection

Bank erosion is a natural process that is important in supplying a river with sediment such as gravel, which is used by fish for spawning. Erosion often becomes a problem when it is accelerated by grazing, with the associated lack of vegetation and vital root structure within the bank, and the physical damage by livestock. Past channel alterations (dredging and straightening) and hard bank revetments can also exacerbate erosion, as can in-channel structures which interrupt sediment transport. Somewhat counterintuitively, the simplest bank protection measures are often the most effective, like simply excluding livestock or using soft, diffuse structure to turn the high flow-energy area into a lower energy area.

In the following example, fencing to exclude livestock, tree planting and light regrading by hand with spades is all that was required to restore bank stability.





## Brash Bank Protection

Brash bank protection entails installation of brushwood/branches to protect the bank face and/or toe, prevent undercutting and retain any slumping material *in situ* long enough for vegetation to establish. The brash is pinned down with further branches over the top as batons, which are secured at either end with posts and sometimes a length of low-tensile wire. It can be beneficial to include live willow within the matrix, as it will usually take root and grow if in contact with damp sediment. Additional grass seed and tree planting can help, but are not always necessary. This method also requires livestock exclusion to treat the issue as well as rectifying the symptoms.

Contrary to popular belief, the hard, tidy lines of many bank protection measures, including willow spiling, can be counterproductive, and often simply deflect flow energy onto other areas of the bed or bank – much as harder, artificial bank protection does. This is why willow spiling can often fail in its first year or two, after which the bushy growth can begin to protect the bank. It is usually far better to protect a bank from the start, leaving a scruffy, brashy edge that baffles flow and encourages deposition of fine sediment. That deposition can even help to rebuild the bank line, providing a nutrient-rich growing medium for the vegetation that will ultimately colonise and stabilise the bank. A nice scruffy margin is also far better for fish and invertebrates, which will utilise the structure as refuge.



*Above - Live willow being loosely woven between the posts of the bank protection – unlike the hard, tidy line of traditional tight willow spiling (or rock or wood revetment), this provides diffuse protection from day 1, and is far less likely to create erosion issues elsewhere. Also note the valuable in-channel structure created for fish and invertebrates.*





The following sequence shows how the installation of a brush mattress not only halted further erosion but dissipated flow energy sufficiently to facilitate deposition of river sediment that filled the erosion void - in less than one winter. Several years down the line, the area is now a stand of willow and regenerated alder. The contribution fencing made should not be underestimated, as although the brush fixed the erosion scar, the fencing prevented livestock from perpetuating the issue.



