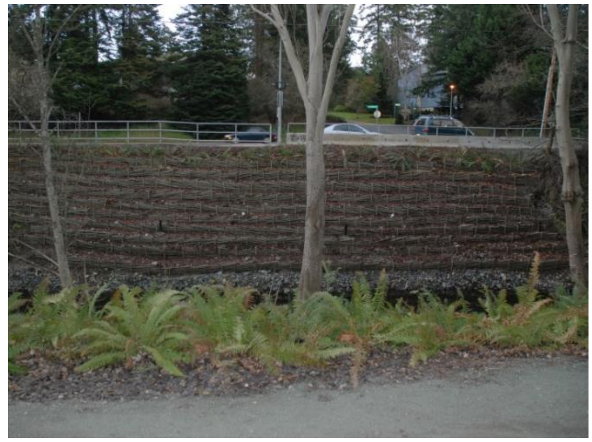
Restoration of Riparian Areas

Ecological restoration is defined (SER 2004) as the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. This definition implies that the best we can do is to help what would eventually happen naturally. This does not include putting a bunch of rip-rap on a shoreline where there are no rocks. So how can we control erosion on a stream bank where active erosion is happening? If we look at how natural streams control erosion, what we find is that natural stream banks are often cloaked in dense stands of pioneering species such as willows, red osier dogwood or alder. Stand densities of 20,000 to 30,000 stems/hectare are often found on stream banks. This density of stems slows the flow of water along the stream bank, taking the erosive energy out of the water. This idea can be used as a treatment by installing dense live staking with plants that will root from cuttings (Photograph 1).

Dense live staking can be used with other soil bioengineering treatments to treat over-steepened stream banks (Photographs 1 and 2). Since heavy erosion often occurs on the outside of bends in a stream, the use of dense live staking at the toe of the slope and wattle fences to treat the over-steepened slope will restore the streambank (Photograph 1). Where construction has resulted in the disturbance of streambanks, wattle fences can be used to treat the over-steepened bank (Photograph 2).



Photograph 1 (left) and 2 (right). Dense live staking (left) can be used on the outside of bends in streams that are eroding, while wattle fences can be used to support the over-steepened streambank (left and right).

Excess gravel in streams can occur as a result of disturbance in the watershed. The excess gravel creates a situation where the stream moves back through the successional stages of stream development. We see the morphology of mature streams take on the characteristics of young streams (Photograph 3). Where these characteristics of streams are the result of natural processes, the natural recovery processes will address the problems (Photograph 3). However, where human activities, such as timber harvesting in the watershed, have caused the problems, treatment of the excess gravel is required or the loss of salmon spawning habitat is the result.

Photographs 4 and 5 show a technique called live gravel bar staking that uses the same principles as dense live staking to slow the flow of water passing over the gravel bar. This allows sediment that is carried in the water to drop out, building up the gravel bar and deepening the stream thalweg.

Photographs 3 (left), 4 (centre) and 5 (right). Excess gravel in streams (left) causes the stream to meander. Live gravel bar staking can be used to capture excess gravel and thus create a root-reinforced streambank with a deeper thalweg. Red arrows show the same tree on the opposite bank.

There are a variety of uses of soil bioengineering that can be applied to degraded streams. In some cases, invasive species such as some forms of reed canary grass can create a dense cover in the riparian zone, restricting the growth of more appropriate woody species. Photographs 6 and 7 show how the invasive reed canary grass can be treated with a dense canopy of red osier dogwood. Many invasive species are not tolerant of shade, so creation of a shady cover can eliminate the invasive species. In many cases, the shady cover not only eliminates the invasive species but also enhances the riparian habitat.

Photographs 6 (left) and 7 (right). Dense stands of reed canarygrass were established in this farm field (left). Pulling the sod back from the edge of the creek and staking with red osier dogwood creates a dense canopy of shade-producing shrubs (right) that have eliminated the grass and allowed a lovely shady creek to be available for spawning salmon.

Effective ecological restoration creates resilient riparian zones. Basing restoration on processes that have been solving stream bank erosion for millions of years, we can find effective solutions to our erosion problems. These solutions will also enhance the aquatic biota and will look natural.

SER, 2004. The SER Primer on Ecological Restoration. Version 2. October 2004. Science and Policy Working Group, October 2004. Society for Ecological Restoration International. Washington DC. accessed on April 2, 2020 (http://www.ser.org/page/SERDocuments).

Text and photos by Dave Polster