

# Creek Bank Restoration and Repair

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The New Year's Eve Flood exacerbated the erosion of creek banks from Fairfax to Ross, and in some places the erosion was so severe that roads and bridges were closed. However, not all erosion is bad. Creeks need to be able to adjust to natural events in the watershed by changing their shape, while undercut banks and fallen trees provide important habitat for steelhead and other creek dwellers. Answering the following questions may help you to determine whether to intervene in erosion on your property, or to let nature take its course:

1. Is the erosion threatening a structure, road, or other important property?
2. Is the erosion threatening riparian habitat or a significant tree?
3. Is the erosion extremely active? Is it more rapid during most rainstorms?
4. Does the erosion appear to be caused by a structure such as a road, culvert or yard drainage system?

Erosion is the cause of most creek bank failures. Finding the cause of the erosion is essential to developing an effective solution. Erosion is caused by water from any of the following possible sources:

- **Surface Flow** Often the easiest to address. Water flowing over the top of the ground usually causes steep, vertical bank erosion. Common sources include drainage pipes installed through the bank slope, driveways, or drainage from roofs.

- **Ground Water** Water flowing a few inches to a few feet below ground level frequently emerges on a streambank before reaching the creek channel. Planting these areas with native plants is a good method for controlling erosion caused by groundwater. Make sure that you are not contributing to subsurface flow through excessive garden irrigation.

- **Stream Flow** Natural changes, such as big storms or human activities, can cause the stream channel to adjust. Removing vegetation along a creek can reduce streambank stability and lead to streambank failure.

## Planning a Repair or Restoration Project

Documenting your site is an important first step for any creek repair project. If you are planning on repairing the site yourself, you will need the following information in order to obtain any necessary permits. If an engineer or agency is helping you repair the site, this information will save them time and therefore save you money.

1. Photograph the site. It is a good idea to include some sort of reference object (such as a shovel, a basketball, or a person) in the photo, to help indicate the size of the actively eroding area.
2. Make a sketch of the site. Include length, width and height of the eroding area. Show structures and how far away they are. Include vegetation and any biological information you know (e.g., what kind of fish use the creek).
3. Walk up and down the stream if you can. Indicate on your sketch what is happening near your site. Usually something happening upstream is causing the erosion to occur, such as rock riprap, a fallen tree, or something that may be redirecting the flow of water. Are your neighbors experiencing similar erosion problems?
4. Observe the water flow. Does water flow year round? Does water only flow when it rains? Does the creek dry up in the summer?

**Cooperative Projects** If some of your neighbors have similar stream bank erosion problems, you might want to consider working together. Benefits include sharing the permit and planning costs, and repairs that complement and even enhance each other. Cooperative projects, done in

conjunction with a local agency or group, can also be eligible for private or government grant programs.

### Design Considerations

- **Remember the needs of fish and wildlife.** Does your design include native plants that will provide habitat and refuge for wildlife in the creek? Is your setback from the top of the creek bank adequate to allow appropriate riparian vegetation to grow along the creek? The extensive root systems of some native plants can help with streambank stability. Even rock riprap, when interplanted with willows or other trees at the time of installation, can enhance habitat.

- **Biotechnical Restoration** Biotechnical restoration involves the use of native vegetation in combination with structural measures to stabilize or repair a creek bank. The term “biotechnical” is synonymous with “bioengineering.” Sometimes just planting native vegetation along an eroding bank can provide enough stability to control erosion. Some types of biotechnical structures include: willow walls, installation of brush matting, and vegetated rock riprap. For more information on biotechnical restoration, see *Stream Corridor Restoration: Principles, Processes and Practices* or Ann Riley's primer, *Stream and River Protection for the Regulator and Program Manager*. These documents can be viewed on line at the Marin County Stormwater Pollution Prevention web site [www.mcstoppp.org](http://www.mcstoppp.org)

### Engineered Solutions

Sometimes bank restorations and repairs require an engineered solution. All engineered projects should integrate river science (fluvial geomorphology) into the design. Projects that incorporate geomorphic principles are designed to work with the stream's existing channel shape and discharge. This type of an approach will help the stream attain an equilibrium condition and may increase the flood flow capacity of the creek by providing a larger area for water to spread over during floods. This approach will also sustain in-stream habitat. Your project should never impair, and where possible, should enhance the natural creek processes. Some examples of the geomorphic approach include restoration of a stable creek channel and floodplain. While it is not always physically possible to implement this approach in urbanized creeks, it is always important to consider the creek's shape and form when considering solutions. These and other approaches are addressed in the manuals referenced above.



*This San Anselmo site is subject to severe creek flows, but this biotechnical solution using riprap, cables, and native plants held firm during the New Year's Eve flood.*

Be sure not to constrict the channel. By placing your retaining wall or rock work too close to the center of the stream you may be inadvertently narrowing the creek and cause yourself more problems, or cause erosion on your neighbors' properties.

**Permitting** Most creek bank repair projects require permits from the U.S. Army Corps of Engineers, the Regional Water Quality Control Board, the California Department of Fish and Game, and your local municipality. MCSTOPPP hosts regular meetings with the regulatory agencies to assist landowners with the permitting process. The meetings are held the 2<sup>nd</sup> Friday of each month. Contact Liz Lewis at 499-7226 or [lizlewis@co.marin.ca.us](mailto:lizlewis@co.marin.ca.us) for more information and

to schedule an appointment. Go to the Creek Permits page at [www.mcstoppp.org](http://www.mcstoppp.org) for application forms and instructions.

### **Other Considerations**

- Be careful to protect water quality and existing habitat during construction. If the creek you are working in doesn't go dry in the summer be sure to take measures to avoid muddying water in the creek. Protect existing native plants along the bank if possible, or salvage them prior to construction and re-plant them during the re-vegetation stage of the project. Generally, all work should be scheduled for the low flow period, usually between June and October.

- Projects that involve installing new plants often require watering and maintenance for the first few years in order for the plants to take successfully. Many large failures are caused by small problems that could have been avoided if caught early on. Check your repair before the rainy season and after each storm. Take photographs after a year or two from the same point where you shot the "before" photo. It's fun to watch a site's vegetation mature and settle in, and it may also help others design effective repairs.

- Share your successes with MCSTOPPP! We'd like to have a list of sites that have been repaired (especially those incorporating biotechnical designs), that we can use to recommend this approach to other property owners with similar problems. If you have photos or success stories, please send them to us at [mcstoppp@co.marin.ca.us](mailto:mcstoppp@co.marin.ca.us).

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