Stand By

Your Stream™

"Streamside Restoration - A Team Effort"

An Outreach Program for Stream Management

While walking along your stream, you notice some changes in your streamside that you never saw before (Fig. 1). The stream bank has become undercut or there are cracks and slumps in the soils next to the stream. Or perhaps you have been managing your farm for several years and are gradually realizing that a significant amount of your valuable crop soil is lost to erosion downstream each spring. What should you do?

Teamwork and **careful planning** are two key ingredients for the successful restoration of a streamside. Both elements are critical to avoid wasting money and considerable effort, and to reduce the chance of future problems. The following summary provides an overview of the steps needed to restore your streamside successfully.

Step 1: Involve your streamside neighbors.

The health of your stream and streamside can be strongly influenced by activities elsewhere along the stream corridor. Talk to neighbors who own streamsides upstream and downstream from you and get them to assess the health of their streamsides. Mapping damaged areas on a U.S.G.S. topographic map provides a convenient way to overview the extent and probable causes of stream corridor problems. If appropriate, pursuing streamside restoration as a community effort can provide considerable clout when accessing funding and resources and getting permits.

Step 2: Get technical assistance.

The actual restoration project may require considerable manpower, technical expertise, equipment, materials and government permits. It makes sense to get help right from the start. Representatives from the local Soil and Water Conservation District or from the Natural Resource and Conservation Service are trained to address streamside restoration. These people will visit your site and assess the extent of the problem, the probable causes and then work with you through the remediation process.

Step 3: Assess the probable cause.

Just as with a human illness, correctly diagnosing the cause of the streamside problem is critical in order to choose the best cure. It is unwise to try and diagnose the cause of the streamside problem without expert assistance. However a general understanding of the theory, combined with your personal knowledge of the site's history, will help you to provide useful information to the experts so that they can make a more accurate assessment.

Remember that it is not always easy to determine the cause if a lot of time has passed, if damage occurred when the site was flooded, or if the problems were caused by activities outside the immediate area.

erosion*: cumulative loss of individual soil particles from the streambank surface*

failure*: a large section of the streambank breaks away from the streamside and slides into the stream.*

Signs of Poor Health

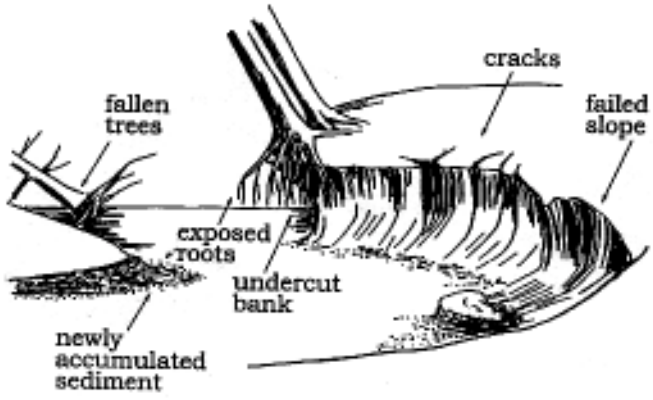

Figure 1

Probable causes of streamside *erosion* and *failure* can be divided into three types based on their source:

On-site, streamside factors:

Clearing of the riparian vegetation is the most frequent cause of streamside damage. Without plant roots to hold the soil, and stems and leaves to retard flood flow, the soil is easily eroded. Freeze-thaw cycles systematically loosen the exposed surface soils and encourage their erosion.

Heavy traffic in the streamside, from livestock, pedestrians or vehicles, all break up soil structure, kill plant roots, and encourage channelized runoff through the streamside. Increased loading from vehicles or structures on the streambank surface also weakens the underlying support, leading to slumping and bank failure.

Increased water runoff will cause gullies and sheet erosion. Belowground, groundwater buildup may cause pressure which loosens and weakens the soil matrix.

Nearby, in-stream factors:

As water moves down the stream channel, its velocity and path are influenced by obstacles along the way. Newly fallen logs and large debris can divert the flow against a stream bank. This rediverted flow can result in serious erosion, steepened banks, and undercutting. Straightening or changing a stream's natural curves during shoreline development will redirect water flow and may cause increased erosion downstream.

Long-distance, watershed factors:

The width, depth, and amount of curving (called sinuosity) of each stream channel is determined by the water flow and sediment load that the stream experiences during storm flood events. Land use changes upstream, such as clearing of forests for development or agriculture and more impermeable surfaces, can result in increased runoff and greater discharges and sediment loadings. The shape of the channel will change downstream to accommodate the more powerful flow.

Step 4: Select an appropriate method.

Obviously, if redirected flow by fallen trees or large debris has caused bank erosion, then removal of the object will help to return the stream to its original course.

Reshaping of the bank is probably the first step needed if the slope is steeper than 33 ^{o} (1:1.5). Depending on the project size, the banks can be hand-shaped with shovels and pick-axes or sculpted using heavy equipment. Subsequent hand-smoothing with rakes will be needed to eliminate rough patches. Hay bales, sandbags and other devices should be used to keep sediment out of the stream.

Revegetation of the exposed bank and streamside is the most common and "eco-friendly" method for streambank repair. This may be accomplished rapidly by planting healthy cuttings, posts or seedlings of flood-tolerant trees such as willow and redosier dogwood. Seeding with grass mixes can also quickly establish a dense root matrix that holds soil in place, although woody species are needed for long-term protection.

Physical structures are sometimes needed to protect a streambank, for example, where streambanks adjacent to roads are severely eroding. Large wire containers filled with rocks are called "mattresses" and "gabions" and may be needed in areas of forceful flow. Most physical methods are expensive, labor and resource intensive, and do not allow for later changes in the stream flow patterns.

Step 5: Assemble all necessary resources.

After determining the appropriate method, a schematic of the proposed work is needed. The project coordinator will identify the amount and type of materials that will be needed, including plants, soil, riprap, tools and so on. Labor and moving equipment needs must also be considered. This information will form the basis for a permit application.

Streamside repair activities require permits if they entail soil excavation or fill or structural work below the high water mark. The Natural Resource Conservation Service acts as lead agency on most restoration projects and is a good first contact. In some regions, NRCS has been given blanket permits for multiple restoration projects to reduce paperwork. However, the NYS Dept. of Environmental Conservation officially regulates these activities under Article 15 of the Clean Water Act and will coordinate with the U.S. Army Corp of Engineers for a federal permit if needed. Local town ordinances may also be relevant for some dredge and fill projects. Processing of permit applications generally take 3 months or longer, so plan ahead.

Streamside restoration projects can vary in expense depending on the length of the site to be repaired and the need for materials and labor. Currently the U.S. Dept. of Agriculture has several cost-share programs which provide funding to farmers and landowners for streamside improvements.

Step 6: Restoration in progress.

The timing for actual restoration activities is important. Most bank shaping works best at low water, typically in mid to late summer. However, plantings will then need to be monitored to ensure sufficient water is available. Banks should not be exposed when winter storms arrive or severe erosion will result. Assemble all materials neatly at the site ahead of time and be sure to schedule for the relevant construction workers and laborers well in advance. It is important to follow common-sense safety precautions, including providing safe access to the site, accessible first-aid supplies, and appropriate protective clothing.

Step 7: Follow-up and Maintenance

Follow-up and maintenance are an important part of the restoration process. Plantings and seeds will need most attention immediately following the project until they get a dense root system established. Ater high waters recede in the spring, look over the site for gaps in the vegetation and damage to physical structures. Keeping a record of the site through photographs is helpful for assessing gradual changes. Replant and repair as needed.

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