



Slope Stabilization Using Vegetation

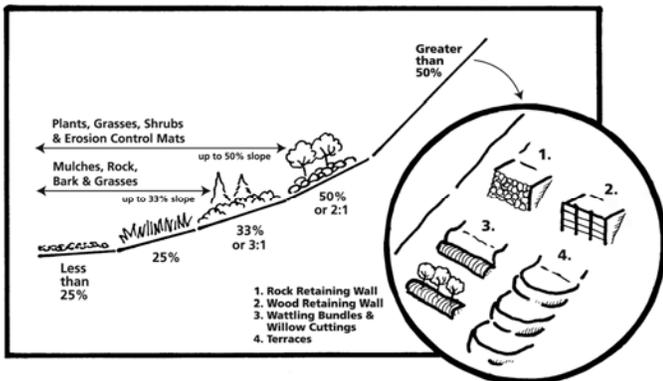
USDA, Natural Resources Conservation Service

Background

Disturbed slopes with exposed soil are subject to erosion and deliver sediment to nearby waterways. Many slopes can be stabilized by establishing vegetative cover. Plant roots help anchor the soil and reduce compaction, allowing precipitation to infiltrate rather than flow down the slope. Above ground structures such as leaves and stems protect the soil surface from the impact of raindrops and slow down surface flow so that it has a better chance of infiltrating. Establishing native vegetation can help change an eroding slope into an attractive addition to your home landscape.

Potential Uses for Vegetative Slope Stabilization

Vegetation will be most effectively established on slopes less than 50% or approximately 30 degrees. On steeper slopes, vegetation should be combined with structural techniques such as rip-rap, terracing, retaining walls, or gabions.



A protractor or a simple clinometer can be used to determine the degree of slope in your project area and help you develop the most effective treatment for erosion control.

Getting Started

There are a many things to take into account before you buy your plants. Slope steepness, soil type and PH, drainage, available moisture and sun exposure can greatly influence the success of the planting. Tahoe soils are generally acidic and coarse textured with limited water holding capacity and available nutrients but vary with landscape position. South facing hillsides will be the driest while valley bottoms will have deeper, more developed soils. Native and adapted species will thrive here with little assistance. Contact information is available at the end of this document if you would like assistance in characterizing your site.

Late summer or early fall is the best time for planting. This avoids the water stress caused by the hottest days of summer. Spring planting can be successful with careful monitoring and irrigation.

Select a variety of native or adapted plants rather than seeding only one species. Your efforts are more likely to be successful if you don't put all your eggs in one basket. Also, having a mix of species with various growth rates and root structures will more rapidly build support for the soil. An erosion control seed mix containing native and adapted grasses, wildflowers, and shrubs is available from the Tahoe Resource Conservation District upon request. Measure your project site and purchase the appropriate amount of seed to thoroughly cover the area.

Preparing the soil

Begin by removing any invasive species. For help with identification of invasive plants contact your local Conservation District or visit tahoeinvasiveweeds.org. Additionally, maintaining existing native vegetation on the slope will give a good start to any hillside planting - be aware that trees are very sensitive to any change in grade around their trunks.

If shrubs are removed from the site for defensible space purposes, retain the roots to help hold soil in place.

Prepare the seedbed by gently loosening the upper 6-12 inches of soil and removing and stockpiling litter to be reapplied as mulch after seeding. Removing litter prior to seeding is important to ensure that the seeds will have good contact with the soil and will survive after germination. If possible, till one inch of mulch or compost in to the upper six inches of the soil. With the exception of compost, wood chips or mulch, fertilizers should be avoided. Native species are adapted to Tahoe soils and rarely need additional nutrition.

Planning for Irrigation (If needed)

Seeded areas should only be irrigated for one growing season. Often native species, seeded into properly prepared soil in the late summer or early fall will receive sufficient water from natural precipitation and will not require irrigation.

For spring seeding or during a dry fall you will need to provide water. Start with watering to a depth of three inches and

progress to a depth of 10 inches over the growing season. Start by watering every two to three days and gradually build up to longer intervals between watering as the plants mature or until rains begin. Don't overwater! Keep a close eye on you plants and continually evaluate your irrigation plan. If you see signs of erosion such as small rills or exposed soil, you might be watering too much. If your plants show signs of stress, you might need to water more and possibly re-apply mulch.

Container plants will require irrigation to a depth below the root zone immediately after planting and for two growing seasons to facilitate establishment.

Use an Appropriate Seeding Rate

Select native or adapted species. Seed at 50-200 pure live seed (PLS) per square ft. Large seeded competitive species should be seeded at 50 – 100 PLS per square ft. Gently rake the seeded area with a metal toothed garden rake to cover the seeds with a thin layer of soil.



Photo Credit: CA DOT

Planting from Containers

Use small and deep containers. The larger the root system is in relation to the plant, the greater the chance of survival. Container plants are expensive and require more maintenance, however they can be well suited for small scale, well managed projects. Consider species common in the areas directly adjacent to your site. Remember to handle your plants carefully! Avoid dropping, drying, drowning, baking, or freezing your plants. Excavate a hole 3-5 times the diameter of the container. Saturate and drain the hole completely before planting. Be careful when removing plants from containers and preserve as many fine roots as possible. Loosen or cut circular or matted roots so that they radiate from the root ball. Place the plant in the hole so that the crown of the root is at the same level with the surrounding soil. Backfill around the root ball with native soil or amend with 30% compost. Gently tamp soil to ensure that the roots have contact with the soil, but do not overly compact. Build a small basin around the plant to retain water.

Mulching

Place a litter or mulch layer 1-1½ inches thick over the seeds. Too little mulch will leave the soil surface exposed; too much mulch will inhibit seed germination and can be a fire hazard.

Additional Tips and Considerations

Incorporating logs, boulders, or rip rap into a slope stabilization project can add interest to the site, aid in slope stability and encourage a diversity of plant species by offering different microclimates.



Be sure to protect the site from foot traffic or other disturbance until plants are mature. If frequent access is necessary, design an access trail or stairway that will resist erosion and will isolate disturbances to re-enforced areas.

Additional Resources

- *Living with Fire-Lake Tahoe (second edition)*: defensible space practices and guidelines.
- *Erosion Control Plants for the Tahoe Basin – Slope Stabilization Series*: slope stabilization species lists.
- *Home Landscaping Guide for Lake Tahoe and Vicinity*: slope stabilization techniques, planting and irrigation methods.

Referenced documents may be downloaded from www.tahoercd.org.

For further information contact:

In Nevada: Nevada Tahoe Conservation District
1-775-586-1610 Ext 28 www.NTCD.org

In California: Tahoe Resource Conservation District
(530) 543 – 1501 Ext 113 www.TahoerCD.org

Natural Resources Conservation Service
(530) 543 – 1501 Ext 3