Role of Riparian Vegetation in Bank Stability

Riparian vegetation greatly contributes to bank stability. Bank soil texture also influences bank stability.

Reducing Erosion
Riparian vegetation root systems hold soil in place and above-ground plant material reduces water flow speed during periods of high flow. Vegetation on the bank face can reduce scree and the associated undercutting and collapse of the upper bank. Vegetation growing within the channel itself will reduce scree by decreasing the flow speed of the water adjacent to the bank while providing an effective buffer by absorbing wave energy. Riparian vegetation also protects the soil from erosion caused by runoff.

Preventing Bank Collapse
Root reinforcement by riparian vegetation is usually the most important safeguard against bank collapse. Tree roots can substantially increase soil strength to a depth of at least two metres (6 feet) and to a horizontal distance equivalent to the canopy drip line.

Riparian vegetation on the face of a streambank helps to support, or buttress, the soil up slope from it, preventing collapse. In addition, banks can become unstable when saturated with water. Vegetation conserves much of the groundwater present in streambanks, reducing the risk of sudden collapse due to soil saturation.

Improving Infiltration
Vegetation also helps to increase the permeability and infiltration of the upper soil layers. This allows surface water to penetrate the soil rather than run off, decreasing the amount of erosion and sediment flushed into the stream.

A Note on Bank Soil Compaction
Coarse, unconsolidated soils are extremely susceptible to erosion and require vegetation with strong, deep root systems. More cohesive soils with higher clay contents are more resistant to erosion.

Potential Effects of Grazing on Bank Stability

Unmanaged livestock grazing can cause physical damage to the stream channel and its banks as well as impair the growth and productivity of the riparian vegetation. Excessive trampling by livestock can shear the banks, causing erosion and changing the shape of the channel.

Vegetation
Overuse of the riparian zone by livestock can result in decreased plant vigour and biomass, a change in species composition and diversity and the loss of essential vegetation components, especially trees and shrubs.

Management practices should ensure that vegetation is maintained on the streambank, especially deep-rooted vegetation such as trees, shrubs and sedges, and that grazing the riparian area is avoided during vulnerable periods.

Ensure proper utilization rates
In order to maintain woody vegetation, animal use of woody plants (browse) should not exceed 25 per cent of the second year and older growth. Sedge and grass utilization should be less than 65 per cent.

Avoid grazing during sensitive periods
Generally, grazing in the riparian zone should be avoided during late spring/early summer and late in the fall. Streambanks are most susceptible to damage by trampling when soil moisture levels are high, so spring grazing should be deferred until soil moisture levels have declined. In late fall, plants that help provide bank stability are susceptible to damage that could impact their vigour and ability to survive.

Grazing Strategies to Improve Bank Stability

Bank structure and soil
Higher soil moisture levels, such as those found in the spring, make streambanks more susceptible to damage by trampling, which can increase erosion. Livestock activity can result in gapping, rutting or bankrocking of the soil in saturated areas along the streambank. Increased soil moisture also makes soils more vulnerable to compaction, which decreases infiltration and increases runoff. Soils with silt and clay are more susceptible to compaction from trampling than sandy soils.

Manage livestock access to the waterway
In general, livestock access to surface water should be limited. If animals must congregate near a water source, leave buffer strips along the streambanks. Buffer strip widths should be modified to address soil and slope considerations. A general rule is the steeper the site, the wider the buffer strip. For bank stability, the first 5-10 metres (16 feet) are critical, however buffer widths of 15 to 30 metres (50 to 100 feet) are generally recommended.

Draw livestock away from the waterway
Salt and mineral supplements should be located away from the riparian zone to draw cattle away from the area. A minimum distance of 15 metres (50 feet) is recommended. This helps to prevent bare patches created by high animal traffic. Fence corners, where cattle tend to congregate, and off-stream watering sites should not be placed in locations that are naturally more susceptible to erosion - on the outside of meander bends, for example. They should be a minimum of 15 metres (50 feet) from the streambank.