Protecting Shorelines & Streambanks - *Naturally!*

Cows and Fish Fact Sheet

The streambank or lakeshore you stand on is made up of water-deposited and water-worked materials: silt, sand, clay, gravel, cobble or boulders. What holds shores and banks together and prevents them from continuously moving? The riparian areas of streambanks and shorelines are glued together by a diversity of plants with strong, deep and dense root systems. Substantial reinforcement is provided by woody plants; the trees and shrubs.

Trees and shrubs "glue" the riparian areas on streams and rivers together, reducing erosion.

Riparian areas are the green zones around lakes and wetlands, the emerald threads of water-loving vegetation that border rivers and streams, and the lush fringe in valleys. They are the edges, the borders and the transition zones that divide uplands from water. Riparian areas are called many things: shorelines, floodplains, bottomlands, bogs, muskegs, sloughs, wetlands, seeps, marshes, potholes and springs. What is common to all of them is a unique combination of water, soil and vegetation. Riparian areas buffer the effects of land use in the uplands from water, and protect uplands from erosion by water. The tiny bit of landscape called riparian traps sediment, stores water, reduces erosion and filters water. When all of the "ecological" functions mesh together in healthy riparian areas, we see forage, shelter, fish, wildlife, water and many more services produced. Protecting and managing riparian areas pays dividends, especially preventing erosion.

Riparian areas around lakes and wetlands include emergent vegetation in the water plus vegetation on the moister portion of the shoreline; both protect the shoreline from erosion by waves.

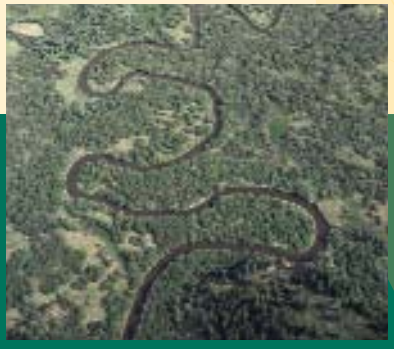
As the percentage of roots in streambanks and shorelines increases, there is more resistance and erosion decreases.

Erosion Explained

Moving water has horsepower and that energy is used to dislodge and move bank and shoreline materials. The amount of horsepower is based on the weight of water and the speed at which water moves. Water is a relatively heavy substance, a cubic meter weighing almost as much as a mid-sized car (1000 kg). Increase the speed of that weight of water and its ability to erode and move other things increases. Flood events involve the greatest volumes of water, the highest speeds of water, and thus the most horsepower. All of that moving water has to go somewhere and when the volume of water exceeds the capacity of the channel, the water climbs out into the low lying area called the floodplain. If a stream or river cannot periodically escape into a floodplain, and if abundant, diverse and healthy riparian areas do not exist, horsepower will be translated into erosion - lots of erosion.

Streams erode the outside of meanders and deposit materials downstream on the inside of meanders. The right vegetation slows the rate of erosion.

Floodplains, coupled with riparian vegetation, slow water down and reduce horsepower.



Streams meander to balance water speed, valley slope and amount of sediment transported. Straightening streams and removing vegetation increases the amount of erosion.

Multiple stream crossings, roads, clearing and drainage signal problems in this watershed. The cumulative effect of all land uses in a watershed contributes to more erosion.

The loss of native vegetation, especially trees and shrubs, has resulted in more unstable banks on this stream. This stream has less ability to deal with erosion and to repair the damage will require restoration with appropriate riparian vegetation.

When the Bank Slips Away. . .

In the tension between land and water, water always wins. Healthy, well vegetated riparian areas slow the rate of erosion and balance erosion in one spot with bank or shoreline increases through deposition elsewhere. Should unstable banks concern you? That depends on the scale and type of instability, the extent of the threat that the erosion poses, and whether the problem is localized or is a product of changes elsewhere in the system. If unstable banks are occasional, limited to a few outside meander bends, and the banks revegetate within a year, erosion rates are normal. A problem has developed if the amount of instability has increased over past years and no evident revegetation is taking place. More erosion results from more energy in the system and from reduced health of the riparian area. To identify the problem requires looking upstream and upslope.

Riparian Vegetation

The Roots of the Solution

North or south, east or west, vegetation is the best. Streambanks and shorelines that are slipping away due to erosion often have developed the erosion problem over many years. It is extremely difficult to solve erosion problems overnight but once the threat of erosion becomes obvious we tend to want a quick fix. Quick fixes often involve the use of heavy machinery and big rock; the "hard" solutions. Such fixes look like they have solved the problem, but the reality is they are "band-aids". The test of an effective solution is how long it lasts. That's why riparian vegetation needs to be part of any plan, as the "soft" solution. Riparian vegetation grows, binds materials together, strengthens banks and replaces itself. It absorbs moisture, increases the roughness of banks, which slows erosion, and it does it all with minimal cost, requiring only a little management.

Stream energy can be difficult to predict and can be higher than the design specifications. Water moving at 0.5 meters/second can move a 0.2 kg rock. During flood events, water moving at 3 meters/second can move a 70 kg rock. Add ice to the mix and rip rap, which is considered stable, may easily be moved.

"Hard" solutions to erosion need to meet regulatory approval, be well engineered, skillfully constructed and regularly maintained. They will be expensive to construct, costing up to $500/meter on small systems and over $1000/meter for larger ones.

1978 In 1978 erosion threatened a nearby road.

1982 The solution, in 1982 was to reshape and rip rap the riverbank with large rock.

2006 By 2006 the river has broken through the rip rap and continues to erode toward the road.

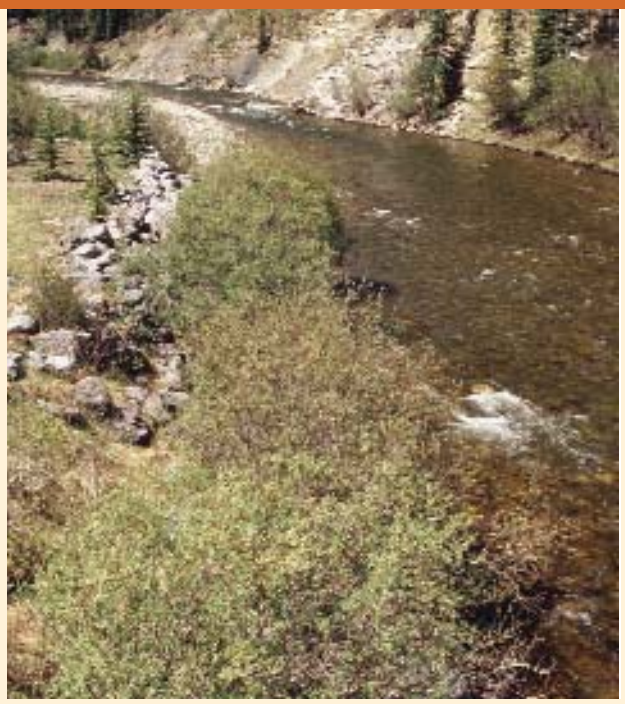
Water probes, pushes, tests, attacks and outflanks our "fixes".

Riparian Vegetation
A "soft" solution for the **hard** problem of erosion

Large boulder riprap was used in 1983 to solve a bank erosion problem. This may have contributed to the stream changing course by 2006. Sometimes "hard" structures cause channel shifts and the problem may be relocated elsewhere.

Regaining streambank and shoreline stability may require the temporary use of erosion control structures, especially where insufficient riparian vegetation exists. Solutions may also require a watershed view to see all of the things that contribute to instability. Long term stability will occur when erosion is in balance at a watershed scale. What's the best long term solution to an erosion problem? Protect, manage and restore the right kinds of riparian vegetation.

Aussi disponible en français.



Riparian vegetation can strengthen some erosion control structures, increase effectiveness, add fish and wildlife values and reduce maintenance.

Riparian pieces LOST

Riparian pieces FOUND

A cheaper, longer lasting solution to erosion is to protect, manage and add riparian vegetation. If critical pieces are lost, especially the bank-binding plants like trees and shrubs, it will be very difficult to control erosion.

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