Growing Restoration

Natural Fixes to Fortify Streambanks

Cows and Fish Fact Sheet

Planning on restoring an eroding bank or other area?

Success of any restoration project often depends on the right tools and the right material. In soil bioengineering treatments for streambank stabilization, the right material is generally the kind of live plant material that is found locally. These trees and shrubs will establish most successfully and last into the future to continue the job of holding banks and shorelines together.

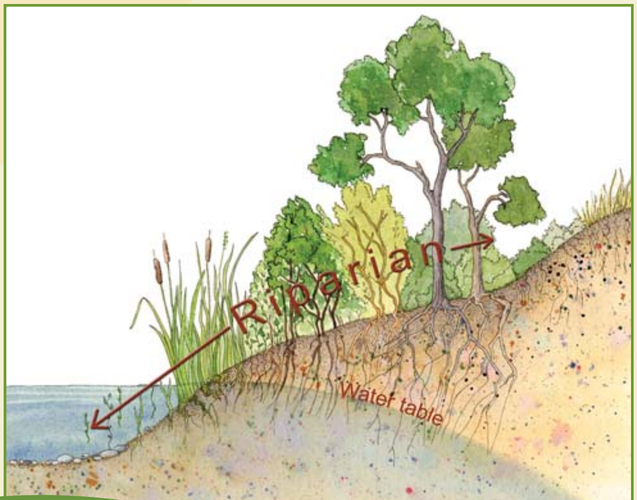
Red-osier Dogwood

What to use and where to find it?

Look upstream and look downstream. Plants that are growing along the same water body or system will be most suitable. If there is not enough vegetation available on that water body, then look in neighbouring areas and water bodies. Remember that wherever you harvest live plant material, leave the donor site with enough plants to maintain that site.

The kinds of plants that will be most successful for a restoration project depend on regional climate, so harvest in an area with similar climate and soil conditions. For example, species used in prairie regions will be quite different from those that might be used in the boreal forest. Selection of **pioneering** species will always be better than using later successional species. Pioneering species are those plants that are the first inhabitants of a given area following a disturbance. Over time the plant communities naturally begin to change from pioneering species to successional species. Simply consider that many **riparian** sites (moist areas next to water bodies) in the foothills are dominated by spruce; however, restoration should focus on establishing willows and cottonwoods (poplars) since, in a natural cycle, these plants would occur prior to spruce communities.

Most riparian sites have a variety of moisture conditions. Generally, areas close to the water's edge are wetter, while areas well above the water can be very dry. Select plants based on where they will be used in the project along this moisture gradient. Take cues from species already growing in the location at a nearby reference site. For example, while willows and red-osier dogwood are both good plant choices, they have different needs. Most willows do well next to water because they are tolerant of flooding, while red-osier dogwood is less tolerant and can grow in drier areas, including uplands in the parkland and boreal regions.



Gathering the Material

First things first: Obtain approvals to collect material and work near water (e.g., from Alberta Environment, Alberta Sustainable Resource Development, and Fisheries and Oceans Canada). Call these agencies if you are uncertain about requirements, rather than finding out that you required an approval after the work is complete. Secondly, ensure that people gathering plant materials know how to tell a willow apart from an alder. You must be able to identify appropriate plant species if harvesting from the wild.

For soil bioengineering structures, tree and shrub cuttings that are able to sprout buds and roots from branches should be used. These include most willows, poplars, and red-osier dogwood but not alder. Where these collections are being donated from the wild, collect only 5% of the seed (if propagating in a nursery first) or plant material scattered over as large an area as possible. Limit harvest of an individual plant to less than one third of the total live stems emerging from one root system to ensure that this plant survives. Never collect plants or plant materials from riparian areas except where they are to be lost to construction or where the riparian area is overgrown and collections will help rejuvenate the stand.

Loppers are used to trim branches from a stem. Trim all branches that are smaller than 2 cm.

Most plant materials are best collected during the dormant period, which generally occurs when leaves are not present between September and March. The exception to the dormant harvest rule is where aquatic plants are harvested and will be planted immediately into an aquatic setting. In these cases (e.g. the use of cattails and bulrushes for providing wave protection along shorelines), active growth of the plants will help them re-establish in their new location.

Cuttings should be trimmed so that the smallest part of the cutting is a minimum of 2 cm in diameter or about the size of your thumb ('rule of thumb'), and at least 50 cm to 3 m long, depending on which soil bioengineering treatment is being used. Ensure cuttings are healthy and growing well; that is, they should be green and soft if the bark is scraped away. Avoid dying or diseased wood.

A lot of live but dormant plant material is needed to construct a bioengineering project. A way to easily transport that amount of material is needed.

For the most effective use of plant cuttings, use what you harvest within a few weeks. If plants need to be stored for longer, remember to handle and treat the material like living plants. Cuttings need to be kept moist and protected from hot sun, drying winds and drying frosts. To extend the viability of cuttings, store them in a dark area to slow metabolism. Wrap cuttings with wet burlap and soak with water every day or two. Cuttings may be stored in a cold storage facility (about 0^0C) or snow banks, as long as they are kept moist.

Project Construction

Organising a soil bioengineering project is a complex task that is largely dependent on scheduling for optimum plant growth and viability. Avoiding high water may be an important consideration for structures that are designed for erosion control. Fall or early spring are generally good times of the year for constructing soil bioengineering projects. Projects have the best chance of success when constructed in the dormant period.

Soak cuttings for 10 days prior to use if possible. This promotes root growth but care should be taken to avoid storing cuttings in water for more than 2 weeks. The type and amount of plant material needed depends on the technique used. A good approach is to familiarize yourself with bioengineering treatments and estimate the numbers and lengths of cuttings necessary to complete your project by linear meter of each treatment along the shoreline.

A variety of tools and equipment are needed to construct a soil bioengineering project. The following list includes some commonly used equipment:

- Pruning shears (heavy duty)
- Industrial loppers
- Chainsaw (and all safety equipment to go with it)
- High visibility vests and hard hats when working in large groups
- Steel pry bars
- Water jet/stinger (to open holes for planting cuttings)
- Grub hoes/Pulaski (a combination axe and grub hoe tool)
- Picks
- Shovels
- Rubber mallets or sledge hammers

Wattle fence construction on West Nose Creek. The tools and techniques of bioengineering are quite simple, but the process can be labour intensive.

The initial row of live poles for wattle fences are placed near the water's edge. These poles are usually larger in diameter than the poles placed horizontally behind this row. Poles should be at least 80% underground as being demonstrated here.

The waterjet stinger was specially designed to use high-pressure water to hydrodrill a hole in the ground to plant cuttings.

Maintenance & Monitoring

The primary reasons for failure of many soil bioengineering projects are lack of summer moisture and improper planting techniques. Plants will take advantage of spring moisture, sprouting, and periods of rapid growth; however, subsequent periods of dry weather during the summer can easily cause plants to die due to insufficient root growth to support those shoots. Watering newly planted areas may be necessary during this period to ensure survival.

The key to effective riparian restoration is to deal with the causes of increased erosion, as well as to ensure there is monitoring and maintenance of the constructed project. A monitoring program should look at how the site is functioning ecologically. A simple check will help you identify whether you have considered the issues:

- Have I addressed any land-use issues that may be affecting the erosion problem?
- Has the restoration work improved the function of the riparian area by:
    - Strengthening banks?
    - Providing soil binding root systems?
    - Providing shade?
    - Filtering upland pollutants?

Once your restoration project is complete, it will need ongoing monitoring and attention for 2 or 3 years at a minimum until plants become established. This means ensuring that high water or animal activity (especially beaver) have not damaged the structure, that there is adequate moisture for plants to grow, and aggressive plants, such as reed canary grass or weeds like Canada thistle, are controlled. If these kinds of species become established early, they may prevent the successful growth of woody species. Disturbance caused by constructing a soil bioengineering treatment may create ideal conditions for invasion by weeds and subsequently become a source of infestation along a water body. Be aware of the potential impacts of invasive species and have a plan to deal with them. Think about long term goals for the site and how you want the site to look.

Sometimes one treatment will not solve the problem. Monitoring is essential to determine if further treatments need to be applied. Some projects may accomplish restoration goals even if the planted vegetation fails to grow. Soil bioengineering structures might allow other plant species to establish or change site conditions to allow a change in flow regimes affecting sediment deposition processes. Restoration of riparian function is the best gauge of a successful project.

Aussi disponible en français.

Photo Credits: Elizabeth Saunders, Amanda Bogen Halawell, Craig Schell, Dave Polster   Illustration: Elizabeth Saunders

For more information please contact:
Cows and Fish www.cowsandfish.org
Email riparian@cowsandfish.org   Phone (403) 381-5538
Fisheries and Oceans Canada www.dfo-mpo.gc.ca

Contributions from Shane Petry, DFO, Lethbridge and Dave Polster, Polster Environmental Services are greatly appreciated. Their dedication and insight made this project possible.

Printed in Canada 03/07
10,000 copies

Fisheries and Oceans Canada   Pêches et Océans Canada

Canada

Cows and Fish Members

Producers & Community Groups, Alberta Beef Producers, Trout Unlimited Canada, Canadian Cattlemen's Association, Alberta Sustainable Resource Development, Alberta Agriculture Food and Rural Development, Alberta Environment, Fisheries and Oceans Canada, Agriculture and Agrifood Canada-PFRA, Alberta Conservation Association

Funding Associates include

Alberta Environmentally Sustainable Agriculture