

Riparian FACTSHEET



Ministry of
Agriculture

Riparian Factsheet - No. 9 in Series

Order No. 810.210-9
June 2012

ECONOMICS OF AGRICULTURAL RIPARIAN PLANTINGS

The goals of this factsheet are:

- To provide agricultural producers in British Columbia with a framework for estimating benefits and costs of planting riparian areas
- To outline plant material alternatives for planting riparian areas.

While there are costs to improving the riparian buffer zone, it is also important to consider the benefits of such initiatives. Some of the benefits may be hard to quantify or put in dollar terms.

Benefits

Society's Benefits

Riparian buffer zones are desirable from a public perspective because of the expectation of environmental benefits. Some public benefits from private land riparian buffers are:

- Improved water quality;
- Fish and wildlife habitat;
- Water course stability – low flood and erosion risks;
- Greenspace – aesthetics.

The environmental benefits of each buffer zone will depend on such things as the species that are planted, the width of the buffer zone, land uses adjacent to the zone, and upstream and downstream conditions. It may take years for the full benefits to take effect and for the public to be aware of them. For these reasons, it is very difficult to put a dollar value on the environmental benefits.

Landowners' Benefits

While landowners who are looking at establishing riparian buffer zones may appreciate the environmental benefits to society, they are likely more concerned with the benefits and costs to them individually. The following is a list some of the possible benefits to the individual:

- Clean water free of sediments, nutrients and pesticides;
- Stable stream banks - minimal erosion and flood damage;
- Habitat for beneficial predatory insects and birds ;
- Good public perception;
 - aesthetics and higher land values
 - may be able to use as a marketing tool
- Meet environmental regulations;
- Increased farm safety (less chance of equipment rollovers, etc);
- Possible cash crops – integrated riparian management;
 - medicinals and botanicals – native and introduced
 - floral crops
 - forages
 - range
 - fruits, berries and nuts
 - seed and grain
 - riparian nursery – cuttings and seed
 - non timber forest products
 - wildlife crops

Landowner Costs

- Planning and engineering ;
- Land taken out of production ;
 - loss of crop production
- Planting;
 - seed and plant materials
 - ground preparation, fertilizer, soil amendments
 - weed control
 - machinery costs (rental or depreciation, fuel, repair and maintenance)
 - labour to prepare, plant, and maintain
- Fencing if required;
- Installation of offsite livestock watering;
- if you provide habitat for harmful insects and birds, there could be damage to crops

Planning the Riparian Planting

Plantings in agricultural riparian areas should be done to correct a problem identified while doing a riparian assessment. Properly planning and estimating the financial cost of the planting are important first steps in successful riparian plantings.

Riparian areas are as variable as the environment we live in. Plantings in riparian areas can vary from small plantings of willow cuttings at the stream edge at little or no cost to large stream works that can carry very high financial costs. Farm and ranch managers should evaluate the work to be done and materials required in order to produce the result desired at the lowest cost. The most important issues that need to be considered include:

Is Engineering Work Required ?

Engineering work may involve in-streams works, installation of rip rap, large woody debris, weirs, geotextiles or other materials. In-stream work is the actual digging, dredging or reshaping of stream channels. Engineering works of these kinds usually involve large machinery and hired labour and are the highest cost riparian projects. For large projects of this type landowners should consider hiring experienced contractors. These contractors will be able to suggest options to achieve project goals and cost estimates of the various options. Estimating the costs of these large projects is beyond the scope of this factsheet. Remember that it is necessary to obtain authorization prior to doing any works in and about a stream. For further information about agency requirements and engineering solutions to riparian problems please see the *Drainage Management Guide*.

Site preparation and Planting Methods

Site preparation is a very important part of a successful riparian planting. Site preparation may include:

- Machine re-sloping of the stream bank
- Tillage equipment for preparation of a seedbed
- Weed control with herbicides
- Removal of woody vegetation growing in the wrong location
- Hand removal of weeds

The method of site preparation to be used must be based on cost and a number of other factors:

- **Slope and Slumping Problems:**
 - There is no point in planting a stream bank that is slumping or is likely to slump
 - If the slope is too steep for the soil type, slumping may occur
 - Machines should not be operated on steep slopes; site preparation in these areas will have to be done by hand.
- **The existing vegetation:**
 - Problem weeds that must be controlled prior to planting
 - Heavy stands of grass and other vegetation that will make planting difficult and provide severe competition to newly planted trees and shrubs
 - The need to protect and work around existing trees and shrubs
 - Can herbicides be used for site preparation or should weed control be mechanical?
- **Soil Conditions:**
 - Is the soil compacted or too hard to plant into
 - Are there large rocks or wood on or in the soil
 - Will the soil structure be damaged by the use of rotovators and other heavy equipment?

Woody Plant Material Choices

Woody plant materials are trees and shrubs. Planting material for trees and shrubs come in a variety of forms each having its own set of benefits and drawbacks. The type of plant material used should be chosen based on the lowest cost that will achieve the planting goals, i.e. to perform the desired function.

Remember, the most cost effective woody plant materials are those that are already growing on site before project works starts. Every effort should be made to protect suitable shrubs and trees that are growing in suitable locations in the riparian area.

Plant material used in the riparian plantings and reasons for choosing them are as follows:

Plant Material Form	Relative Plant Material Cost*	Relative Labour Cost*	Usual Reason for Using and Drawbacks
Seed	1	1	<ul style="list-style-type: none"> • Low cost usually for grasses, forbs and other species that are most easily propagated with seed. • High cost of seed of native species
Unrooted Cuttings	1	2	<ul style="list-style-type: none"> • Low cost, readily available, easy to plant. • Some cuttings fail to grow.
Rooted Cuttings	2	3	<ul style="list-style-type: none"> • Relatively low cost, high establishment success with good management • Sensitive to drought and weed competition due to small size
Small container stock	2	3	<ul style="list-style-type: none"> • Relatively low cost, readily available, easy to plant • Sensitive to drought and weed competition due to small size
1 – 3 gallon container stock	3	3	<ul style="list-style-type: none"> • Higher cost, requires more labour to plant • Larger stock is less sensitive to drought and weed competition
Small bare root stock	2	3	<ul style="list-style-type: none"> • Relatively low cost for good size stock • Higher labour to plant, sensitive to drought till root establishment
Large bare root stock	3	5	<ul style="list-style-type: none"> • Relatively low cost for good size stock, will provide function quickly • Very high labour requirement, restricted species availability
Small ball and burlap stock	4	4	<ul style="list-style-type: none"> • High cost, restricted species availability. • Less sensitive to drought and weed competition than smaller stock
Large ball and burlap stock	5	5	<ul style="list-style-type: none"> • Very high plant material costs, very high labour costs to plant. • Excellent survival, lower maintenance costs, will provide function quickly.

*Cost rating is from 1 to 5, 5 being the highest cost.

Planting Methods and Equipment

There are a number of planting methods and equipment that can be used. As with the type of plant material choices must be made for specific reasons. Some of the choices are:

- Small stock and cuttings can be planted by tractor mounted transplant machine (if the land is

trafficable), by hand held transplant tools or by hand with hand tools.;

- Seed can be spread by hand, by hand drive machine, by tractor mounted machine or by a hydroseeder;
- Cuttings can be pushed directly into soft soil or they can be planted into a hole made with a dibble or steel bar.

Partial Budget Worksheet for Riparian Buffer Establishment or Improvements

This simple partial budget can be done on a cash basis. It allows for the amortization of capital costs over a chosen time period but does not take into account the

time value of operating cash inflows and outflows. A more sophisticated net present value analysis could be done to calculate the value in today's dollars of a series of cash benefits and costs over a period of time resulting from an investment.

CAPITAL (ONE TIME) COSTS	
Planning and engineering	
Seed and plant materials	
Ground prep, soil amendments, etc	
Labour	
Machinery costs	
Fencing, off-site watering	
Other	
Total capital costs	
Amortization period	
Discount (interest) rate	
Annualized payment of capital costs	

YEARLY COSTS AND BENEFITS:			
Benefits	\$	Costs	\$
Increases in income		Reductions in income	
Crops		Crop revenue	
Cost share payments			
Total increases in income		Total reductions in income	
Reductions in cost		Increases in Costs	
Crop production expenses		Weed control	
		Labour	
Reduced soil erosion		Property tax increases	
Other			
		Annualized payment of capital costs	
Total Reductions in cost		Total increases in cost	
Total benefits = total income increases + total reductions in cost		Total costs = total income reductions + total increases in cost	
Net benefit = Total benefits – Total costs			

FOR FURTHER INFORMATION CONTACT

Don Low
 Phone: (250) 402-6429
 Email: don.low@gov.bc.ca

INNOVATION AND INDUSTRY DEVELOPMENT BRANCH

Ministry of Agriculture
 1243 Northwest Blvd.
 Creston, BC Canada V0B 1G6