



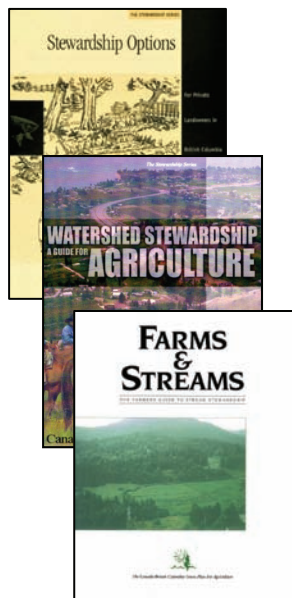
11 STEWARDSHIP AREAS

INTRODUCTION

This chapter discusses stewardship areas for protection of the environment. It contains introductory information on the relationship between these areas and the environment. It also contains information on environmental concerns, legislation and beneficial management practices related to:

- ◆ buffers
- ◆ riparian areas

STEWARDSHIP AND SUSTAINABILITY



Stewardship. This term is often used when dealing with issues surrounding the environment. Stewardship is loosely defined as “*the individual’s responsibility to manage his life and property with proper regard to the rights of others*”.

Stewardship is not only important to aquatic life and wildlife but to landowners as well. Healthy streams and riparian areas create a positive influence, for example, on the health of adjacent uplands, which are often productive farmland. Similarly, stewardship of native grasslands ensures continued biodiversity and resulting economic returns to the farm by creating long-term livestock forage availability. → see Stewardship crops, page 4-9

- 📖 **Watershed Stewardship: A Guide for Agriculture**
- 📖 **Stewardship Options for Private Landowners in B.C.**
- 📖 **Farms & Streams: The Farmers Guide to Stream Stewardship**
- 📖 **Fringe Benefits: A Landowner's Guide to the Value and Stewardship of Riparian Habitat**



Sustainability. The root of this term is “sustain”, and could be defined as “management that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Sustainability is actions and considerations practiced by agricultural producers that utilize farm resources to ensure the success of the farm in a manner that considers the economic, environmental and social outcomes. When applied to natural resources, sustainability considers all parameters to ensure their long-term viability and success.

BUFFERS, RIPARIAN AREAS, AND THE ENVIRONMENT

Environmental concepts related to buffers and riparian areas are listed in alphabetical order below.

Buffers

Buffers on farms are generally defined as specially managed areas used to separate farm activities from sensitive areas that may be impacted by those activities. The objective of a buffer is to intercept and retain contaminants, preventing them from reaching a sensitive area or to deliver other agricultural or environmental benefits as described below. See Figure 11.1, next page.

Buffers can function as a barrier to reduce the risk of contamination or as an active or passive “treatment system” to remove contaminants before they reach sensitive areas. Most buffers are either a specially managed area of crops, a combination of crops and trees, or designed landscape plantings, and can include physical barriers such as fences, walls or berms. Buffers may be situated adjacent to farm buildings, manure storages, watercourses, or fields which receive manure or pesticides and are meant to protect watercourses, wells, roads, trails, and recreational or urban areas from adverse impacts. Buffers can provide a multitude of other benefits such as:

- ◆ reducing erosion and runoff
- ◆ enhancing aquatic and terrestrial habitat
- ◆ increasing soil productivity
- ◆ providing aesthetics and visual barriers
- ◆ reducing noise, odor and dust
- ◆ providing stable microclimates
- ◆ providing economic diversification

Many other terms are used in place of the word ‘buffer’ depending on their intended use. These include shelterbelt, windbreak, landscaped buffer, trap crop, catch strip, vegetative filter strip, hedgerow, conservation buffer, field margin, living snow fence, or riparian area.

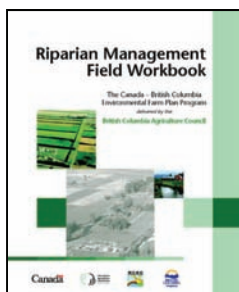
Riparian Areas

Areas bordering watercourses or wetlands are known as riparian areas. Common to all riparian areas are the following:

- ◆ a combined presence and abundance of water, either on or close to the surface
- ◆ vegetation that responds, requires and survives well with abundant water
- ◆ soils that are modified by abundant water, stream or wetland processes and lush, productive and diverse vegetation.

The riparian areas along watercourses include the banks, a diverse array of plants and animals and the floodplain. A riparian area can be part of a buffer. See Figure 11.1, next page.

 **Riparian Management Field Workbook**



Setbacks A setback is a distance separating two things. It is not meant to be a treatment area like buffers. For instance, a setback may be required between a property line and a building. → see Farm Building Siting, page 2-4

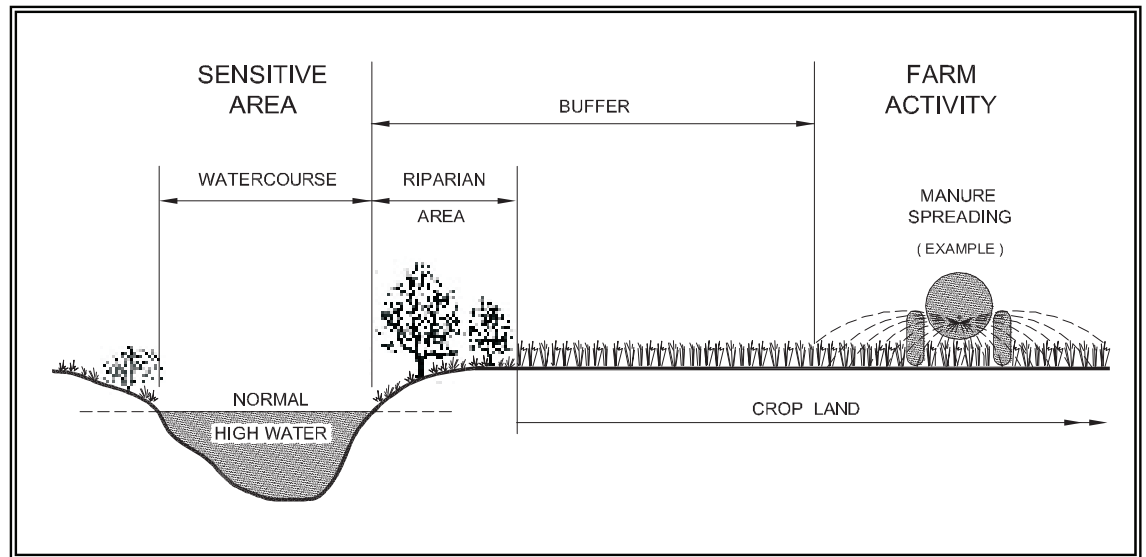


Figure 11.1 Relationship between Buffers and Riparian Areas



BUFFER ENVIRONMENTAL CONCERNS

Primary environmental concerns related to ineffective or non-existent buffers are:

- ◆ contaminated runoff reaching a watercourse
- ◆ pesticide drift causing air, water, or soil pollution
- ◆ unreasonable odour, noise, or dust reaching neighbours
- ◆ uncontrolled temperature management resulting in inefficient heating or cooling of livestock, equipment and buildings
- ◆ soil erosion by wind or water
- ◆ weed, insect, or disease pest invasions
- ◆ unreasonable disturbances of wildlife at crucial times of the year

For detailed information on these concerns:

- ➔ see Impacts on Biodiversity and Habitat, page 7-8, and refer to Farm Activities and Impacts
- ➔ see Water Quality and Quantity Factors, page 9-2, refer to Contaminants
- ➔ see Air Quality Factors, page 10-1, refer to Contaminants, to Dust and Particulates, and to Odours

BUFFER LEGISLATION

The following is a brief outline of the main legislation that applies to buffer use.

- ➔ see page A-1 for a summary of these and other Acts and Regulations

Local Bylaws

Local governments may regulate aspects such as setbacks to control odour, noise and nuisance issues.



Environmental Management Act

The *Code* under the *Agricultural Waste Control Regulation* has requirements for agricultural wastes:

- ◆ Section 3: agricultural wastes, ... must be collected, stored, handled, used and disposed in a manner that prevents pollution
- ◆ Section 30: agricultural products ... must be managed to prevent the escape of agricultural wastes (agricultural products include farm inputs and outputs)

One way of meeting Sections 3 and 30 is to have effective buffers.



Fish Protection Act

The *Fish Protection Act* enables the protection of fish and fish habitats. Four main objectives of the Act are to ensure sufficient water for fish, enable fish habitat to be protected and restored, improve riparian habitat protection and enhancement, and to give local governments greater powers for environmental planning.

- ◆ Section 4: prohibits new dam construction on specified major rivers
- ◆ Section 6 and 7: allows designation of sensitive streams and recovery plans
 - such streams would have restrictions placed on new water licenses or approvals, or amendments to existing ones until the stream has recovered

Riparian Areas Regulation. This Regulation, under the *Fish Protection Act* establishes directives to protect riparian areas from development and to facilitate cooperation between DFO and the Union of BC Municipalities. It applies to the exercise of local government powers under the *Local Government Act*. The Regulation provides required riparian assessment methods by Qualified Environmental Professionals as a condition of approval for new residential, commercial, or industrial activities.



Integrated Pest Management Act

This Act and the *Integrated Pest Management Regulation* require pesticides to be used according to label directions, such as a specified buffer distance.



Fisheries Act

The three main sections of this Act regarding buffers are:

- ◆ Section 35(1): prohibits the harmful alteration, disruption or destruction of fish habitat unless authorized
- ◆ Section 36(3): prohibits the deposit of deleterious substances into watercourses (deleterious substances could enter through unhealthy riparian areas)
- ◆ Section 38(4): requires reporting infractions of Sections 35 or 36

One way of meeting items 35 and 36 is to have effective buffers.



Pest Control Products Act

Regulations under this Act require that users of pesticides follow the directions or limitations as shown on the pesticide label which may include the need for buffers.

BUFFER BENEFICIAL MANAGEMENT PRACTICES

Comply with the applicable buffer related legislation, including the above, and where appropriate, use the following beneficial management practices to protect the environment.

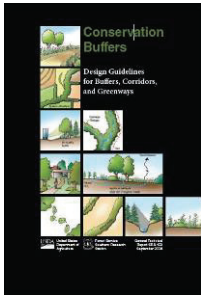
Activities Requiring Use of Buffers

Four specific farm activities may require the establishment of a buffer. Table 11.1, lists both the farm areas or activities and the type of buffers that can be used to protect sensitive areas.

Table 11.1 Farm Activity and Buffer Type		
Farm Activity	Buffer Type	To Protect
Intensive Livestock	Runoff Buffer Mist and Dust Buffer Odour and Noise Buffer	Watercourses, Wells Neighbours Neighbours, Wildlife
Manure Application	Runoff Buffer Mist and Dust Buffer Odour and Noise Buffer	Watercourses, Wells Neighbours Neighbours, Wildlife
Pesticide Application	Runoff Buffer Pesticide Drift Buffer Odour and Noise Buffer	Watercourses, Wells Neighbours, Watercourses, Vegetation, Wildlife Neighbours, Wildlife
Bare or Cultivated Soil	Runoff Buffer Windbreaks and Shelterbelts Mist and Dust Buffer	Watercourses Soil Neighbours

General Buffer Design

Buffers are generally established for a multitude of outcomes and can provide extra insurance against unforeseen environmental problems, but should not be intended as the primary means of intercepting sediments and dissolved chemicals generated as a result of poor farming practices or the lack of a nutrient management plan.



Well-designed and maintained buffers have the capacity to:

- ◆ remove nutrients and pesticides (up to 50 percent)
- ◆ remove certain pathogens (up to 60 percent)
- ◆ remove sediment (up to 75 percent)
- ◆ reduce odour transmission (by up to 50 percent)
- ◆ reduce noise (by up to 50 percent)



Conservation Buffers: Design Guidelines for Buffers, Corridors and Greenways

Buffer Width. Since there are no generally accepted formulas to determine minimum buffer widths for specific functions, it is best to experiment with varying widths while monitoring effectiveness. Buffers may be a continuation of a forage field, a separately managed grass area, a planted belt of trees and shrubs, maintenance of a riparian area along a watercourse, or a combination of the above.

Required buffer widths and composition are a function of:

- ◆ the pollution or nuisance potential of a given farm activity
- ◆ the effectiveness of the vegetation to reduce pollution or nuisance
- ◆ the time of year an activity is occurring
- ◆ the sensitivity of an area to be protected
- ◆ the soil, topographic and climatic conditions associated with a site
- ◆ habitat values necessary to support biodiversity

Figure 11.2, next page, shows examples of suggested buffer widths based on an activity and its risk of impacting a sensitive area. While this example is for manure spreading equipment, the concept applies to other risk assessment situations as well. Application equipment which places manure accurately and directly on the soil surface will require a narrower buffer than, for example, equipment that distributes manure into the air. In addition, solid manure is less likely to move across a field than liquid manure during application or during subsequent rain events.

Buffer widths will vary with the type of activities and the time of year. Figure 11.3, page 11-8, shows an example of adjusting buffer width based on season. An early spring manure application will require a wider buffer than would a summer application. This is due to expected higher rainfalls, greater runoff flow events, and reduced grass nutrient uptake early in the growing season.

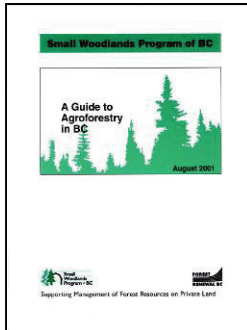
When the risk of contaminated runoff flow is high due to conditions such as high rainfall, reduced plant growth, or frozen soil, buffer width and filtering capacity will need to be increased. Vegetative filter strips function best on slopes of less than five percent and are ineffective on slopes greater than fifteen percent. Filter strips are less effective when plants are not actively growing and taking up nutrients.

Buffer Vegetation. Select plant species for buffers to:

- ◆ enhance beneficial insects
- ◆ be non-weedy or non-invasive → see Weeds, page 5-9
- ◆ not be hosts for pests or diseases which could affect adjacent crops
- ◆ be able to be managed (e.g., by pruning, weed control)
- ◆ have a potential for economic return (e.g., harvest of forage or cuttings)

📖 **A Guide to Agroforestry in BC**

📖 **Riparian Management Field Workbook**



Monitoring Buffer Effectiveness. Ongoing monitoring is required to ensure that a buffer is accomplishing its intended objectives. Assess the effectiveness and integrity of buffers regularly to ensure that a contaminant or nuisance factor is not reaching sensitive areas. If a buffer is not providing adequate protection of a sensitive area, alter the buffer and/or the farm activity causing the impact.

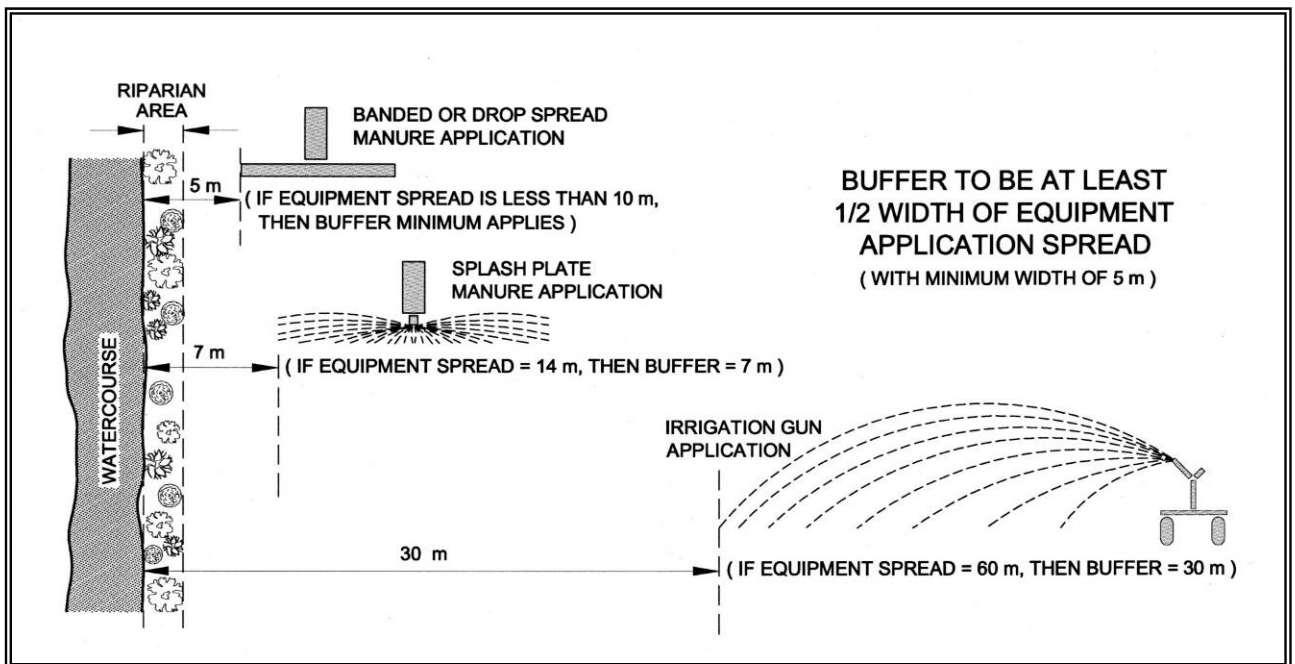


Figure 11.2 Suggested Manure Application Buffer Widths Depending Upon Risk of Activity

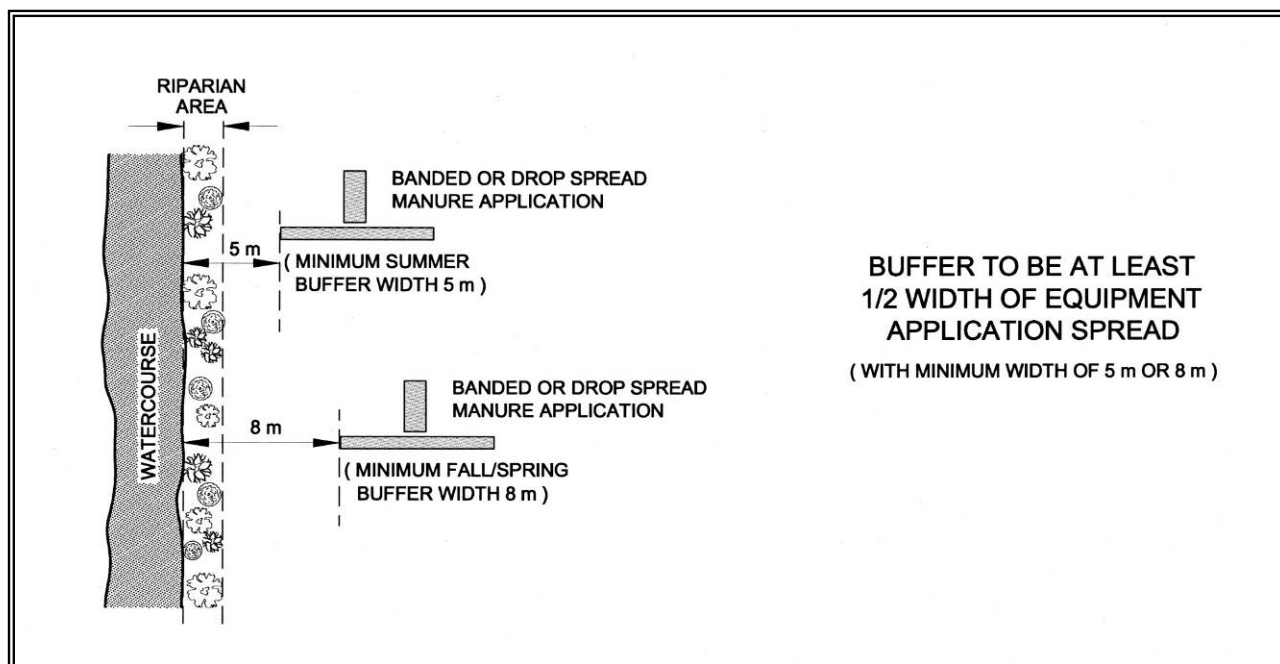


Figure 11.3 Suggested Manure Application Buffer Widths Depending Upon Season

Runoff Buffers

To establish an effective buffer, it is important to determine and implement the following buffer considerations. Note that buffer areas may need to be recontoured to prevent concentrated overland flow.

- ◆ choose buffer designs (vegetation types, layout and buffer widths) that match the site characteristics and sensitivity of a watercourse in order to:
 - catch and filter suspended solids such as manure or eroded soil
 - allow water carrying dissolved or soluble contaminants, such as nutrients and pesticides, to infiltrate the soil
 - minimize bank erosion

In combination with good agricultural practices, buffers are used to minimize the impacts of agricultural activities such as:

- ◆ movement of nutrients, sediment and pathogens to watercourses or wells
 - from intensive livestock operations
 - during and after soil amendment applications (e.g., manure)
- ◆ movement of pesticide residue to watercourses and wells after application

Windbreaks and Shelterbelts

Windbreaks and shelterbelts usually consist of multiple linear rows of various tree and shrub species. They are designed for environmental benefits such as protecting farmsteads and livestock areas, saving energy, enhancing wildlife habitat and for the production of marketable crops.

Windbreaks are specialized design structures such as snow fences or rows of vegetation consisting of trees planted in tight spacings to reduce wind speed, as shown in Figure 11.4, next page. They generally are planted at right angles to the prevailing winds to protect crops, soil, livestock and buildings.

A shelterbelt is usually designed with multiple linear rows of trees and shrub species and function much like a windbreak. They have multiple purposes such as providing wildlife habitat, improving the aesthetics of an area, or for harvesting of marketable products.

A windbreak or shelterbelt can provide several benefits such as:

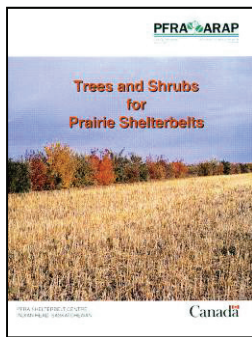
- ◆ protecting buildings from excessive heat loss or gain
- ◆ protecting roads from wind and snow drift
- ◆ reducing soil erosion, soil moisture loss and crop stress
- ◆ altering the microenvironment for enhancing plant growth
- ◆ providing noise and visual screens
- ◆ improving air quality by reducing and intercepting dust, chemicals and odours
- ◆ improving irrigation efficiency
- ◆ improving habitat connectivity
- ◆ sequestering carbon

➔ see Other Concepts Related to Climate Change, page 12-1

Tree or fence windbreaks may be used to protect buildings, roads, or fields. They have the ability to protect a distance of up to 30 times their height. Tall grass provides soil erosion protection; however, because grasses are more flexible, the protected area will only be 5 to 7 times their height. Figure 11.5, next page, illustrates the effect of windbreaks on reducing velocity. The optimum density of the windbreak for reduction in wind speed and interception of airborne particulates is 40% to 60%. Density of a planting is defined as the ratio of the solid portion of the planting to the total area planted.



Figure 11.4 Tree Windbreak



The advantages of windbreaks are especially important in dry years when low crop yields result in insufficient residue cover to protect the crop and soil from the drying effect of wind and temperature. Windbreaks also trap snow, increasing soil moisture for higher crop yields. This yield increase typically offsets yield losses associated with the need to take some land out of crop production for the windbreak planting.

- 📖 **Field Shelterbelts for Soil Conservation**
- 📖 **Trees and Shrubs for Prairie Shelterbelts**
- 📖 **Wind and Snow Fences**
- 📖 **Farmstead Planning**

🌐 <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1186590611493&lang=eng#ben>

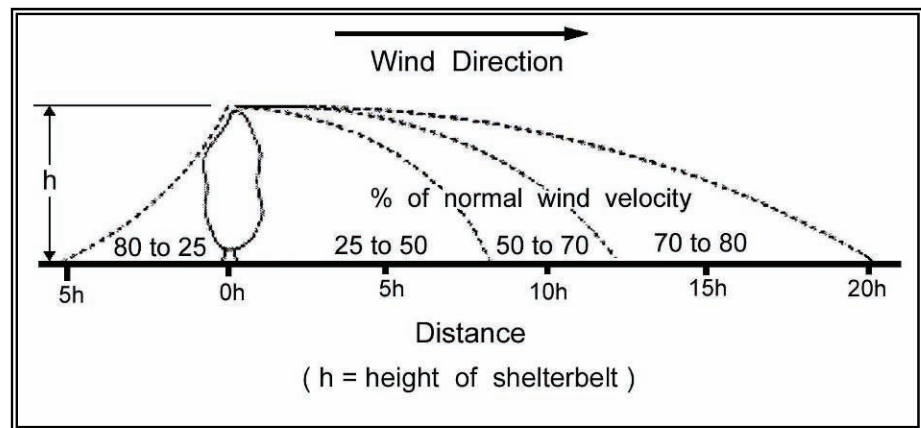


Figure 11.5 Approximate Reduction of Wind Velocity by a Single-Row Windbreak

Buffers for Pesticide Drift

Drift refers to the movement of droplets or vapours, by wind or air current, away from target areas. Drift may result from pesticide applications and a buffer area may be helpful in protecting sensitive areas in close proximity or downwind of an application. Buffers, as indicated on pesticide labels, are actually setbacks and are not active or passive treatment systems as described in this chapter. Pesticide buffers (setbacks) are generally intended for watercourses or for non-target terrestrial areas such as shelterbelts, hedges, woodlands, or wildlife habitat. To help reduce the impacts of spray drift it may be necessary to implement the following practices:

- ◆ maintain an untreated buffer between the treated area and downwind sensitive areas
- ◆ monitor wind direction during spraying to determine when sensitive areas are downwind of the sprayer
- ◆ follow pesticide labels, in particular check for buffers (setbacks) from watercourses, wells, sensitive vegetation and wildlife habitat
- ◆ use pesticide beneficial management practices
 - ➔ see Pesticides, page 5-11
 - ➔ see General Buffer Design, page 11-6.

Note that if vegetation is planted to intercept pesticide drift, then pesticide buffers (setbacks) indicated on the label for sensitive terrestrial areas may have to be followed for the newly planted vegetation.

Buffers for Mist and Dust

Specifications for mist or dust buffers are generally a recommendation of setback distances and species of planting similar to those in windbreaks and shelterbelts. The buffer must be designed to reduce wind velocity in order to allow the particulate matter from agricultural activities to settle out or be trapped on foliar structures like conifer needles. Examples of such activities include fertigation, manure application, dust from field or yard activities, or livestock building ventilation.

Mist Control. Mist refers to the small droplets or vapours generated by farm activities such as manure or pesticide application, (see Buffers for Pesticide Drift above). Mist drift can be reduced by using buffers to trap droplets. To minimize the amount of airborne mist, implement the following practices:

- ◆ use plant density of 40% to 60% to trap mist (the best species for this purpose are conifer tree species such as long needle pines)
 - ◆ select plants with dense branching and twig structure
 - ◆ use long lived species requiring low maintenance
 - ◆ use multiple deciduous species with small leaves, hairy or coarse surfaces
- ➔ see General Buffer Design, page 11-6

Dust Control. Dust refers to particulate matter or soil carried by wind or air current. Dust can be a substantial irritant or safety concern to workers, neighbours and livestock. To minimize the amount of airborne dust, implement the following practices:

- ◆ ground-level foliage such as grass or shrubs should be planted and maintained to trap dust that exits the barn through exhaust fans
 - ◆ remove dust accumulations from the buffer to ensure that foliage growth remains vigorous and effective
 - ◆ establish vegetative buffers such as shrubs and trees along field margins or roads that generate dust during vehicle movement or field activity
 - ◆ use plant density of 40% to 60% to trap dust (the best species for this purpose are conifer tree species such as long needle pines)
 - ◆ select plants with dense branching and twig structure
 - ◆ use long lived species requiring low maintenance
 - ◆ use multiple deciduous species with small leaves, hairy or coarse surfaces
- ➔ see General Buffer Design, page 11-6

Buffers for Odour and Noise

Odour Reduction. An odour buffer is characterized by a tightly spaced tree and shrub planting usually planted in close proximity to a livestock facility and perpendicular to the prevailing winds. Most odours generated by livestock facilities travel as particulates suggesting that buffers or shelterbelts can reduce livestock odours by impeding the movements of these particulates. The function of buffers is that the vegetation creates air turbulence causing the odour to either be diluted or trapped within the foliage. For an effective buffer, implement the following practices:

- ◆ establish effective, vegetative buffers between agricultural operations and neighbours
 - ◆ choose tree and shrub species that effectively screen out particulates and provide an effective visual screen
 - ◆ consider prevailing winds, screens and terrain when designing odour buffers
 - ◆ monitor odour levels in sensitive areas
- ➔ see General Buffer Design, page 11-6
- 📖 **Landscaped Buffer Specifications**



Noise Control. A noise buffer can be a structural barrier such as a noise absorbent or deflective wall, a berm, or a dense vegetative planting consisting of trees and shrubs. Livestock and the operation of equipment can generate significant amounts of noise. Note that vegetation will not stop some sounds such as bird scaring cannons which may need to be deflected by a wall or berm. To reduce noise impacts on humans and sensitive areas, implement the following practices:

- ◆ evaluate the nuisance level of noise created by a specific farm activity
- ◆ establish a sufficiently large setback from neighbours for structures containing stationary power equipment or livestock
- ◆ construct a noise barrier or establish an effective vegetative buffer zone by planting a shelterbelt of broadleaf and coniferous trees and shrubs
- ◆ monitor noise levels in sensitive areas
- ◆ use the standards established by the Farm Industry Review Board for audible bird scare devices

 **Wildlife Damage Control - South Coastal BC**

 **Wildlife Damage Control - Interior BC**

➔ see General Buffer Design, page 11-6

Buffers for Biodiversity

Shelterbelts and buffers can provide benefits to wildlife in several ways, including protection from wind and adverse weather, escape or refuge cover, food and foraging sites, reproductive habitat and travel corridors. Shelterbelts designed for the purpose of wildlife enhancement should be of sufficient size to provide winter food and weather protection appropriate for local climatic conditions. The following buffer practices will help support wildlife:

- ◆ an increase in the density and diversity of native plant species
- ◆ establish buffers to minimize auditory and visual intrusion
 - length and width will depend on wildlife species and critical life cycle period
- ◆ maintain buffers to provide connectivity across a landscape
 - connectivity is necessary during some critical life cycle periods



RIPARIAN AREA CONCERNS

Primary environmental concerns related to riparian area protection are:

- ◆ farm buildings located within riparian setback distances resulting in impacts to vegetation and water quality
- ◆ equipment operation in riparian areas resulting in impacts to vegetation, bank stability and water quality
- ◆ livestock access to riparian areas resulting in impacts to vegetation, bank stability and water quality
- ◆ intensive crop production in riparian areas resulting in impacts to vegetation, bank stability and water quality
- ◆ land clearing and development that results in impacts to vegetation, bank stability and water quality

For information on these concerns:

- ➔ see Pest Management, page 5-1
- ➔ see Impacts on Biodiversity and Habitat, page 7-8, and refer to Farm Activities and Impacts

RIPARIAN AREA LEGISLATION

The following is an outline of the main legislation that applies to riparian area protection.

- ➔ see page A-1 for a summary of these and other Acts and Regulations



Fish Protection Act

The *Fish Protection Act* enables the protection of fish and fish habitats. The four main objectives of the Act are to ensure sufficient water for fish, enable fish habitat to be protected and restored, improve riparian habitat protection and enhancement, and give local governments greater powers for environmental planning.

- ◆ Section 4: prohibits construction of new dams on specified major rivers
- ◆ Section 6 and 7: allows designation of sensitive streams and recovery plans
 - such streams would have restrictions placed on new water licenses or approvals, or amendments to existing ones until the stream has recovered

Riparian Areas Regulation. This Regulation, under the *Fish Protection Act* establishes directives to protect riparian areas from development and to facilitate cooperation between DFO and the Union of BC Municipalities. It applies to the exercise of local government powers under the *Local Government Act*. The Regulation provides required riparian assessment methods by Qualified Environmental Professionals as a condition of approval for new residential, commercial, or industrial activities.



Wildlife Act The provincial *Wildlife Act* protects wildlife designated under the Act from direct harm, except as allowed by regulation (e.g., hunting or trapping), or under permit. Legal designation as Endangered or Threatened under the Act increases the penalties for harming a species. The Act also enables the protection of habitat in a Critical Wildlife Management Area.



Fisheries Act The three main sections of this Act regarding riparian areas are:

- ◆ Section 35(1): prohibits the harmful alteration, disruption or destruction of fish habitat unless authorized
- ◆ Section 36(3): prohibits the deposit of deleterious substances into watercourses (deleterious substance could enter through unhealthy riparian areas)
- ◆ Section 37: requires approval for any work that may impact fish habitat
- ◆ Section 38(4): requires reporting infractions of Sections 35 or 36



Species at Risk Act The purpose of this Act (SARA) is to prevent native species in Canada from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species and to manage species of special concern to prevent them from becoming endangered or threatened. Once a species is legally listed, the Act requires that recovery strategies be developed for extirpated, endangered and threatened species, and that action plans be developed where recovery is feasible.

- ◆ Schedule 1 of the Act sets out the legal list of species at risk (extirpated, endangered, threatened and special concern) in Canada.

Where the Act applies, it makes it illegal to kill, harm, harass, capture or take a species at risk, or to possess, collect, buy, sell or trade any individual or parts of an individual that is at risk. The Act also prohibits the damage or destruction of either the residence (for example, the nest or den) or the critical habitat of any species at risk. Critical habitat is legally identified in a posted recovery strategy or action plan.

While the Act applies to all land and waters in Canada, these prohibitions only apply to areas of federal jurisdiction including migratory birds, all waters (sea and fresh) in Canada, as well as to all federal lands, including Indian reserves and national parks, and the airspace above them.

- ◆ On **private land**, the SARA prohibitions apply only to:
 - aquatic species at risk; and
 - migratory birds listed in the *Migratory Birds Convention Act, 1994* and also listed as endangered, threatened or extirpated in Schedule 1 of the Act

The provisions of the Species at Risk Act (known as the ‘safety net’) could be invoked on BC crown and private lands using a federal order under the Act if provincial action is not sufficient to protect listed species.

Note **that** SARA prohibitions do not apply to species of special concern, and that species at risk in Canada may also be protected by provincial or territorial laws. More information about how the Act applies on private land can be found on the Species at Risk Act public registry at:

 http://www.sararegistry.gc.ca/involved/you/privland_e.cfm



Migratory Birds Convention Act

The Regulation under this Act has sections of importance:

- ◆ Section 6: no person shall: disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird without permit
- ◆ Section 24(1): any person may, without a permit, use equipment, other than an aircraft or firearms, to scare migratory birds that are causing, or a likely to cause damage to crops or other property (other control measures require a permit)
- ◆ Section 33: no person shall introduce into Canada for the purpose of sport, acclimatization or release from captivity a species of migratory bird not indigenous to Canada except with the consent in writing of the Director.
- ◆ Section 35(1): prohibits the deposit of oil, oil wastes or any other substance harmful to migratory birds in any area frequented by migratory birds

RIPARIAN AREA BENEFICIAL MANAGEMENT PRACTICES

Comply with the applicable riparian area related legislation, including the above, and where appropriate, use the following beneficial management practices to protect the environment.

Riparian Areas

The areas bordering watercourses and wetlands, known as riparian areas, usually have vegetation that is different and more productive than the surrounding upland area due to the presence of water. Stream or wetland health is closely related to the vigor and composition of the border vegetation, which in turn, is an important factor in the condition of the water table and surrounding land. The health of a stream is an indicator of the conditions of the surrounding watershed; a stream, in effect, is an “end product barometer” of a watershed.

In the Interior of BC, riparian areas are easily identified as the green vegetation that is in stark contrast to the brown and yellow vegetation of the drier uplands. In coastal areas of BC, riparian areas may not always have this vegetation contrast. Some of the most endangered plant communities in the province occur in riparian areas, especially in very dry regions. In these dry areas riparian areas are particularly important to the health of watercourses and the fish and other aquatic life that depend on them. Healthy riparian areas are critical to protecting stream banks and adjacent farmland from erosion.

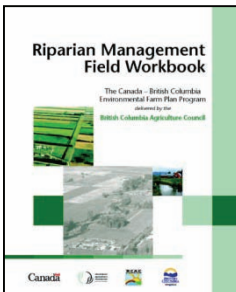


- 📖 **Biodiversity and Riparian Areas - Life in the Green Zone**
- 📖 **Caring For the Green Zone: Riparian Areas and Grazing Management**
- 📖 **Protecting Your Shorelands for Better Farming and Ranching, and Healthier Fish Habitat**
- 📖 **Riparian Areas - A Users Guide to Health**
- 📖 **Riparian Health Assessment for Streams and Small Rivers - Field Workbook**
- 📖 **Watershed Stewardship: A Guide for Agriculture**

Riparian Functions. A healthy riparian area will demonstrate some of the following key ecological functions:

- ◆ builds and maintains stream banks
 - stores floodwater and reduces stream flow energy
 - recharges groundwater
 - traps sediments
 - filters nutrients from water
 - maintains and enhances biodiversity
- ◆ shades the stream to reduce solar heat gain

- ◆ provides overhead cover and protection from raptors
- ◆ provides important nesting, cover and feeding habitat for breeding and migratory birds and other wildlife
- ◆ supports insect life for fish
- ◆ provides large woody debris from riparian areas which
 - provides shelter and resting places for fish
 - adds diversity to the in-stream habitat by allowing the formation of pools and spawning areas
 - reduces stream flow velocity
- ◆ sequesters carbon
 - ➔ see Other Concepts Related to Climate Change, page 12-1



Riparian Management Field Workbook is a publication that forms a part of the **Environmental Farm Plan series on Beneficial Management Practices**. Its purpose is to provide an assessment checklist and guidelines for managing farm activities around riparian areas. This information should be used by producers with watercourses on their farms or those who have intensive livestock operations or crop production near riparian areas. Table 11.2, below, gives four basic riparian assessment questions found in the Planning Workbook that direct producers to the use of this publication.


Table 11.2 Basic Riparian Assessment Questions ★

<p>1. Are the banks of the watercourse free of damage that results in exposed soil or bank slumping?</p> <ul style="list-style-type: none"> Exposed soil or bank slumping can be caused by concentrated overland flow, recreational use, farm equipment or hoof action of livestock. Riparian areas with any exposed soil or bank slumping should be assessed in more detail.
<p>2. Are all areas of the banks of the watercourse covered with some type of vegetation?</p> <ul style="list-style-type: none"> Vegetation protects soil from the impact of storm events that could carry soil from stream banks into the watercourse. Any riparian areas missing some vegetation should be assessed in more detail.
<p>3. Are shrubs and trees present on all watercourse banks? (not applicable if trees or shrubs are not native in that location or if the watercourse is a constructed ditch)</p> <ul style="list-style-type: none"> Shrubs and trees have deeper roots than grass and other herbaceous plants providing a root mass that is more resilient to the impact of flood events and stream scour on stream banks. Any riparian areas that have less than 15% total canopy cover of trees and shrubs (where they should occur naturally) should be assessed in more detail.
<p>4. Do shrubs along or near the watercourse edge grow without a mushroom or hedged appearance?</p> <ul style="list-style-type: none"> Mushroom or hedge shaped riparian shrubs are an indication of over grazing. Riparian areas with shrubs in this condition should be assessed in more detail.
<p>★ Producers with riparian areas lacking these features should refer to the Riparian Management Field Workbook publication for detailed assessment and management ideas to improve riparian conditions.</p>

Riparian Functioning Condition. To evaluate the health of a riparian area, the functioning condition of the area is assessed. Functioning condition is a term that refers to the interactions between the soil, water, geography and vegetation of a site. There are three levels of functionality as shown in Figure 11.6.

- ◆ **Healthy or proper functioning condition:** healthy riparian areas with the most stable, non-eroding lands, the best fish and wildlife habitat and the best agricultural productivity
- ◆ **Healthy but with problems or functional but at risk:** areas that are lacking in some healthy features, and may be experiencing some stream bank erosion, lowering of the water table and fish and/or wildlife habitat may be at risk
- ◆ **Un-healthy or non-functional:** areas that have few if any healthy features, likely to have eroding banks, deepening channels and subsequent lowering of the water table over time, poor fish habitat and poor agricultural productivity

 **Riparian Management Field Workbook**

 **Riparian Area Management: A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas**

Negative impacts on, or loss of, riparian health may also affect the surrounding uplands. Proper functioning condition of riparian areas is the result of good management and benefits all the users within the area, including the landowner.

Some of the key components to management of riparian areas are directly linked to maintaining good soil and water conservation practices across the landscape and preserving, as much as possible, the integrity of the natural riparian zone. Specific land management practices that protect riparian areas include:

- ◆ maintaining a vegetative cover over the soil throughout the year
- ◆ minimizing animal trampling or vehicle traffic on wet soils
- ◆ avoiding overuse of fertilizers or manure that may be transported into riparian areas
- ◆ avoiding applying or disposing of toxic substances on soils
- ◆ protecting against loss of plant diversity and vitality in riparian areas
- ◆ protecting against the establishment of exotic or non-water-loving species in riparian areas
- ◆ avoiding practices that artificially alter streamflow

Riparian Area Management

In some cases, the condition of the riparian area has diminished to the point that it may require some investment to bring the area up to a healthier or proper functioning condition. Improvement of agricultural riparian areas can occur by implementing the following practices:

- ◆ plant new vegetation
- ◆ control invasive weeds
- ◆ encourage a diverse mix of plant species and age that
 - are adapted to the climate, soil and water conditions
 - fosters a good rooting system for bank stability
- ◆ protect vegetation from livestock overgrazing or trampling through a grazing management plan by
 - considering grazing duration and density in relation to plant growth
 - considering stream bank soil moisture content
 - consider improving water supply for livestock by providing an off-stream water system or a restricted watercourse access
- ◆ protect vegetation from harmful pesticide or nutrient management applications

- ◆ improve stability with erosion control structures by:
- ◆ contouring terraces with earthworks and seeding
- ◆ stabilizing gullies and waterways with erosion control matting, silt fencing, seeding
- ◆ stabilizing banks through bank shaping, revetment, gabions, riprap, crib walls, re-vegetation, and blanketing
- ◆ utilizing drop inlet and in-channel control structures
- ◆ improving infiltration of concentrated water flow with filter trenches, filter wells, diffusing wells, etc.
- ◆ installing or upgrading retention ponds and erosion control dams



Healthy or Proper Functioning Condition

- ◆ healthy riparian areas with the most stable, non-eroding lands, the best fish habitat and the best agricultural productivity. Other attributes are the ability to: reduce stream energy therefore reducing erosion and improving water quality; filter sediment; capture bedload and aid in floodplain development; improve water retention and groundwater recharge; develop root masses to stabilize banks; develop ponding and channel characteristics to provide fish habitat; support greater biodiversity. This riparian area would probably score as “healthy”



Healthy But With Problems or Functional But At Risk

- ◆ areas in a healthy but with problems condition that are lacking in some healthy features indicating that some of their water, soil and vegetation characteristics are at risk thus leading to some potential stream bank erosion, lowering of the water table or putting fish habitat at risk. This riparian area would probably score as “healthy but with problems”



Non-Functional

- ◆ areas that have few if any healthy features, likely to have eroding banks, deepening channels and subsequent lowering of the water table over time, poor fish habitat and poor agricultural productivity. This riparian area would probably score as “unhealthy”.

Figure 11.6 Examples of Functioning Conditions of Riparian Areas

Integrated Riparian Management. Agricultural use of riparian areas can occur when the function of the riparian area is maintained. Implement the following practices:

- ◆ if livestock are well managed, forages grown in riparian areas can be harvested by grazing such as in riparian pastures
 - ➔ see Outdoor Livestock Areas, page 3-7, and
 - ➔ see Watering Livestock Directly from Watercourses , page 9-13
- ◆ traditional crops that are planted, managed and harvested appropriately can be grown in riparian areas, such as hay
 - ➔ see Nutrient Application, page 6-8
 - ➔ see Chapter 5, Pest Management
- ◆ specialty crops that can be harvested by hand can be grown in riparian areas and can include:
 - floral crops (pussy willow, contorted willow, ferns)
 - medicinal crops (cascara bark, hawthorn leaves and fruit)
 - food crops (fiddleheads, berries, nuts) and conifer boughs for the Christmas market