

## I reconsider my practices

### PRACTICES

1. Removal of streambank vegetation increases the accumulation of sediment, fertilizers and pesticides in the water, and makes the shores more vulnerable.
2. Non-stabilized draining outlets increase bank erosion and blockage of the drainage systems with sediment.
3. Animals that have access to watercourses trample and damage the streambank, reducing its stability, and polluting the waters with excrements.
4. Undersized culverts increase the risk of erosion and prevent fish from circulating freely.
5. Wide-row crops expose large tracts of land to erosion. The most fertile soil is lost.
6. Farmland manuring without incorporation increases the risk of contaminating rivers and streams.

### EFFECTS

7. Water is warmer, more polluted and oxygen-poor, creating an environment detrimental to aquatic life.
8. Nutrients and sediment accumulate in watercourses and aquatic vegetation grows to excess.
9. Sensitive species of fish disappear, replaced by more resilient but less desirable ones.
10. Loss of topsoil, reduction of arable farm acreage, and clean-up of watercourses represent additional costs to farmers.



## I contribute to healthier watercourses

### PRACTICES

1. Bushes and herbaceous plants left intact slow down surface runoff, filter pollutants, and stabilize the streambank with their roots.
2. Stabilized drain outlets allow the proper functioning of the drainage system and reduce the risk of streambank erosion.
3. The animals are kept from the water's edge, reducing water pollution and deterioration of the streambank.
4. Properly installed culverts of adequate diameter reduce the risk of erosion and allow fish to circulate freely.
5. Conservation practices, such as direct seeding and cover crops, protect the soil against erosion and enhance the structure of the soil.
6. Spreading manure using the incorporation method reduces the risk of watercourses contamination.

### EFFECTS

7. Fresh clean water supports the presence of game fish, as well as faunal diversity.
8. Greater diversity of plants provides food, refuge and reproductive sites for aquatic fauna.
9. Healthy streams and rivers contain diverse, good quality habitats where a greater variety of fish species can thrive.
10. Costs associated with loss of topsoil and the clean-up of watercourses are reduced, arable farm land remains intact and fishing is possible.



# Cultivating at the water's edge

Relations between human beings and nature have given rise to debate in today's society. Most techniques used for exploiting natural resources have come under scrutiny and agricultural practices are no exception. Society expects agriculture to remain productive, yet respectful of the environment.

In bygone years, small agricultural plots produced food to meet the needs of the family, and agricultural practices remained unchanged for a very long time. Traditional production techniques relied on the sparse use of fertilizers and pesticides, and caused very few major environmental problems. Over the years, new techniques were developed that allowed for higher productivity of soil. Big agricultural machinery appeared and chemical products such as pesticides and fertilizers began to be used on a massive scale. Progressively, agricultural exploitation became more intensive and productivity rose. In 1960, a farmer fed seven individuals; today, he feeds 90. However, these results come at a price.



Those radical changes had an impact on the environment. The great quantities of pesticides and fertilizers spread over the fields have become a major source of pollution. Erosion has caused the soil to suffer greater depletion; the fertility of the soil is in decline as the part richest in nutrients is lost. The quality of water in our rivers, lakes and streams is steadily deteriorating as a result of pesticides, fertilizers and sediment input.

And so, in addition to being at the mercy of global market fluctuations, farmers today must also face the disapproval of a society that views many agricultural practices as harmful to the environment. In order to remedy the situation, many actions were undertaken to reduce the negative impact of these practices on the environment. New agricultural practices, more respectful of the environment, have appeared. These new trends allow farmers to move forward with the tools needed to maintain productivity and guarantee a decent family income, while reducing the negative impacts of farming on the environment.

## A VEGETATED STREAMBANK HELPS:

- Reduce the quantity of fertilizers, pesticides and sediment in the waters;
- Prevent silting of the watercourses;
- Decrease or eliminate the need for watercourse maintenance;
- Stabilize water levels;
- Stabilize the streambank;
- Keep water clear and fresh;
- Reduce density of aquatic plants and algae in the water;
- Preserve wildlife habitats;
- Beautify the landscape.



## THE RIPARIAN STRIP IN THE AGRICULTURAL ENVIRONMENT

A riparian strip with dense vegetation is crucial to fight against bank erosion and agricultural pollution. In addition, it also provides an ideal habitat to a wide range of animals that are natural predators of undesirable species, such as vermin.

Bushes and herbaceous growths along watercourse banks require very little upkeep, as they regenerate when damaged. They also extend the life of infrastructures along the edge of watercourses, such as drains outlets, fences and culverts. Moreover, their network of roots reduces the risk of banks slipping or crumbling by diminishing the eroding effect of water.

Riparian vegetation filters water. Without a strip of vegetation, sediment, fertilizers and pesticides are washed into lakes, rivers and streams by runoff.

### Without this filter:

- Sediments accumulate in bodies of water, reducing the efficiency of natural drainage and requiring more frequent upkeep of watercourses;
- As the bodies of water lose depth, the water becomes warmer and less oxygenated;
- The surplus of nutrients causes the proliferation of aquatic plants and algae;
- Chemical substances contained in pesticides modify the characteristics of the water and, thereby, the living environment of many wildlife species.

These conditions are particularly difficult on game fish, such as trout, walleye, pike and smelt.

When the riparian strip is well vegetated, watercourses need little to no maintenance. The vegetation prevents flood and helps keep water levels stable.

Streambank vegetation also creates shade, which helps keep the water fresher. It provides fish with shelter, allowing them to hide from predators. It further provides certain species with ideal habitats to feed and spawn.

With a vegetated riparian strip and the application of sound agricultural practices of soil conservation, the quality of watercourses can be greatly enhanced. And so, little by little, the diversity of aquatic fauna will increase and game fish will reappear.

## CAN THE WATERCOURSE ON YOUR FARMLAND BE HOME TO GAME FISH?

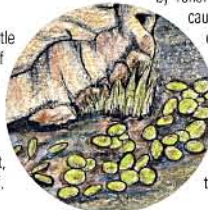
- Is the riparian strip covered in dense vegetation at least 3 meters deep (wide)?
- Is the streambank stable with no sign of erosion or slipping?
- Is the watercourse clear and free of signs of silting?
- Does the watercourse require minimal upkeep?
- Are pesticides and fertilizers spread at the distance from the watercourse recommended by your agricultural advisor?
- Are your drain outlets stabilized?
- Is livestock barred from accessing the watercourse?

If you answered no to any of these questions, you can help improve the quality of your watercourses by modifying some practices.

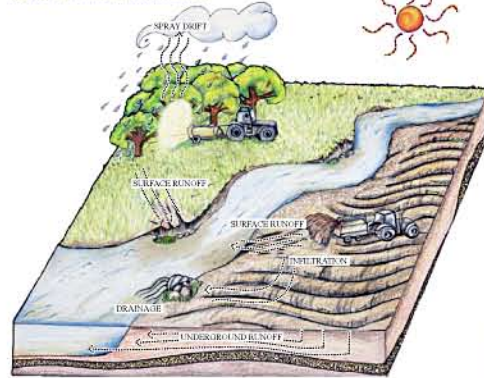


## PHOSPHORUS

Phosphorus, one of the main ingredients contained in fertilizers, is a major threat to bodies of water. Spread over cropland, phosphorus is carried into bodies of water by runoff. In the long run, surplus phosphorus in the water can cause premature ageing (eutrophication). Eutrophication is characterized by an important increase in the quantity of aquatic plants, by the occurrence of algae, and by an overall reduction of water quality. Aquatic wildlife habitats then deteriorate, and certain species of fish, such as the brook trout that requires clear, fresh, oxygenated water, disappear from the watercourses. Other species, more resistant but less interesting as game fish, appear to take their place.



## TRANSPORT MECHANISMS OF POLLUTANTS INTO THE ENVIRONMENT



Generally, pollutants are carried into the environment in three ways: spray drift, surface runoff and infiltration.

**Spray drift** is the horizontal or vertical transport of pollutants in the air, driven by the wind. This happens when pesticides are applied in windy conditions. Pesticides scattered this way can contaminate the environment several kilometres away.

**Surface runoff** is brought about by heavy rain. Water flows on the surface of the soil and carries recently applied pesticides or fertilizers into the watercourse.

**Infiltration** is the seepage of water through the various layers of soil. After rainfall, water loaded with pesticides and fertilizers seeps into the soil which acts as a filter and retains most of these substances. However, if they are too abundant, part of them may reach the ground water and contaminate it.

## VEGETATION-FREE STREAMBANK LEADS TO:

- Greater quantities of fertilizers, pesticides and sediment in the waters;
- Silting of watercourses;
- More frequent watercourse maintenance;
- Streambank erosion;
- Reduced water quality;
- Warming of the water;
- Proliferation of aquatic plants and algae, including cyanobacteria (blue-green algae);
- Disappearance of wildlife habitats;
- Disappearance of certain species of fish.



## STREAMBANK STABILIZATION

The conservation or restoration of streambanks with bushes and herbaceous plants is crucial to preserving the balance of aquatic ecosystems. There are several methods that can be used to stabilize the banks of rivers, lakes and streams, but the simplest is the natural method. It entails planting indigenous vegetation along the banks. The deep roots of these plants efficiently stabilize the streambank, preventing the slipping or crumbling of the banks.

Artificial methods of stabilization consist in building retaining walls, rock fills or the installation of gabions. However, these structures do not create shade over the water, they do not enhance the habitat of fish, and moreover, they are costly to build. Still, there are situations that make the use of these methods unavoidable.

The mixed technique can be used when natural vegetation stabilization alone proves insufficient. This technique combines the solidity of rock filling with the advantages of vegetation.

## FOR HEALTHY WATERCOURSES AND STREAMBANKS:

- Keep a riparian strip with dense bushes and herbaceous plants on a depth (width) of at least 3 meters;
- Avoid using fertilizers and pesticides in close proximity to watercourses;
- Keep arable farmland covered with vegetation as long as possible;
- Keep livestock away from watercourses;
- Store crop fertilizers in watertight structures;
- Avoid digging in watercourses, redirecting its flow or backfilling.



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