

Buffer Action

improving water quality

Buffer strips help control pollution by

sediment filtering

infiltration

plant uptake

Forms of Runoff Pollution

- ▶ sediment
- ▶ nutrients from manure and fertilizer
- ▶ pesticides
- ▶ bacteria/pathogens

Farm Runoff is best controlled at the source by good cropland planning and farmstead management.

Buffer Strips help maintain a productive, p

Important **functions** of a buffer strip:

Streambank Stability: Roots from grasses, shrubs and trees all help prevent stream bank erosion and stream siltation. Stable streambanks and reduced silt buildup will benefit stream health and save maintenance costs. Tile outlets must be designed and managed not to damage the streambank.



Infiltration: Good soil structure and plant root channels in the buffer strip increase runoff infiltration and removal of nitrate through a process called denitrification. Infiltration also slows down the surface runoff, thus increasing the buffer's effectiveness. Cumulatively over long distances, infiltration of water into the buffer can allow for slow release after the run-off period, thereby maintaining higher baseflows in the stream for longer periods of time.



Plant Up-take: Nitrate and phosphorous can easily be transported in solution by runoff over or through the soil. Deep-rooted grasses will transform soluble contaminants. Studies have shown that buffer vegetation and soil microbes can remove over 90% of nitrogen from shallow groundwater moving through the buffer zone and up to 85% of phosphorous from surface water.



Sediment Filtering: Dense, stiff grasses block the flow of sediment particles through the buffer strip. Phosphorous particles attached to these sediments are trapped in the buffer and kept out of the stream. Slow, even movement through the buffer increases the filtering ability. This filtering ability can also filter out bacteria that may be transported by overland flow from adjacent fields towards the watercourse.

profitable and responsible farming operation.

A well maintained buffer of trees, shrubs or grasses can be a pleasure to watch grow. An established buffer strip can add value and beauty to any farm.



Stream Health: Gravel streambeds free from silt buildup, provide a healthy place where fish can thrive. A diverse mix of aquatic life will consume nutrients and form the basis of the food chain. A diverse and complex aquatic community can also help to improve water quality.



Good Guys: Ground beetles and millipedes use buffer strips for cover. They will move into field crops and eat harmful insects such as armyworms and cutworms. These 'good guys' also feed on weed seeds.

Buffer Strips are only one component of an Environmental Farm Plan to help control farmstead runoff.



Control Runoff from fields and barnyards as close to the source as possible.

To help minimize contaminated runoff from farmstead:

- ▶ **Divert** clean water away from livestock exercise yards and feedlots with evestroughing, concrete retaining walls or earthen diversions.
- ▶ **Contain** contaminated runoff from farm yard and manage as liquid manure. It must not pollute surface or ground waters.

Clean water is everyone's responsibility.

How Buffers Improve Stream Health

Habitat: Overhanging vegetation provides shelter for aquatic life. Turtles often choose to hibernate under root masses for protection from predators. Root wads may also provide basking places along the water's edge.



Shade: Shade from overhanging vegetation helps cool and stabilize water temperatures. Cold-blooded species, such as fish, amphibians and reptiles, cannot regulate their body temperature to accommodate large daily water temperature fluctuations. Stable water temperatures are important to their survival. Shade also reduces undesirable weeds by reducing the amount of sunlight that fuels photosynthesis. This reduction in weed growth also reduces the fluctuations in oxygen in the water thereby better protecting water quality.

Organic Debris: Leaves falling into the water from buffer vegetation are an important source of food for aquatic life. Organic debris also provides shelter for aquatic insects and fish. Aquatic life such as clams (mussels) filter contaminants from water.

Gravel Stream

Bottom: Buffer strips filter sediment, preventing siltation of gravel and cobble stream substrates (stream bottom). These 'hard' substrates provide cover for fish and aquatic invertebrates. A silt-covered substrate provides little cover and reduces stream health.

Pools and Riffles: Streams protected from silt loading develop a natural pool/riffle sequence. As water flows downstream, it seeps into the gravel stream bottom at a pool and exits at a gravel riffle. This action helps purify and add oxygen to the water. If stream bottoms are silt covered, this cleaning action is minimized. Pool/riffle sequences are nature's way of dissipating energy and moving sediment during high flows. Therefore, a stream that redevelops this sequence will maintain itself and move sediment out of its channel, thereby improving stream health and reducing maintenance. If streams fill with silt, cleaning action and self-maintenance are minimized.

Pools and Riffles

Gravel Stream
Bottom

Generally, the more natural they are, the less maintenance they require.

Wind Erosion Protection: A treed buffer strip will protect a field from damaging winds to a distance of 10 times the height of the trees. An 80' spruce buffer will increase heat units and subsequent crop yield 800' into the field.

This Brochure was produced by:
**Livestock Manure Pollution Prevention Project,
a sub-committee of Ontario Farm Environmental Coalition**

Working Group Members

Agriculture and Agri-Food Canada
Christian Farmers Federation of Ontario
Dairy Farmers of Ontario
Department of Fisheries and Oceans
Environment Canada
Ministry of Agriculture, Food and Rural Affairs
Ministry of the Environment
Ministry of Natural Resources
Ontario Cattlemen's Association
Ontario Federation of Agriculture
Ontario Pork
Ontario Soil and Crop Improvement Association
Ontario Stewardship
Ontario Farm Environmental Coalition
University of Guelph

The Livestock Manure Pollution Prevention Project is dedicated to helping farmers obtain information that will help them make the right manure management decisions on their farm.

For information, contact Ken Tuininga at Environment Canada (416) 739-5895 or Bob Bedggood, CFFO, (519) 461-1567

For other P3 publications, contact Craig Merkley at the Upper Thames River Conservation Authority (519) 451-2800 ext.235.



Meadowlark

Insect Eaters: Many species of songbirds nest in grass buffer strips until mid-July.

Photo: Jim Flynn

Design of buffer strip can minimize potential damage to field crops by wildlife. Conservation Authorities, Local Stewardship Councils and OMNR can provide advice.

