



# AGRICULTURAL BEST MANAGEMENT PRACTICES

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## AGRICULTURE AND WATER QUALITY

The future of farming depends on our ability to maintain our natural resources, such as soil, water and air. This **Water Quality Matters** publication provides information on the potentially negative impacts that agriculture can have on soil and water quality, and some of the farming practices that can minimize these impacts.

## THE IMPACTS OF AGRICULTURE

In the same way that a weed is a plant in the wrong place, a contaminant is a chemical compound in the wrong place. Compounds that are necessary for successful farming may be unwanted in fresh water. For example, phosphorus is essential to plant growth, but too much of it can cause problems in water. The most common contaminants from agricultural practices include the following.

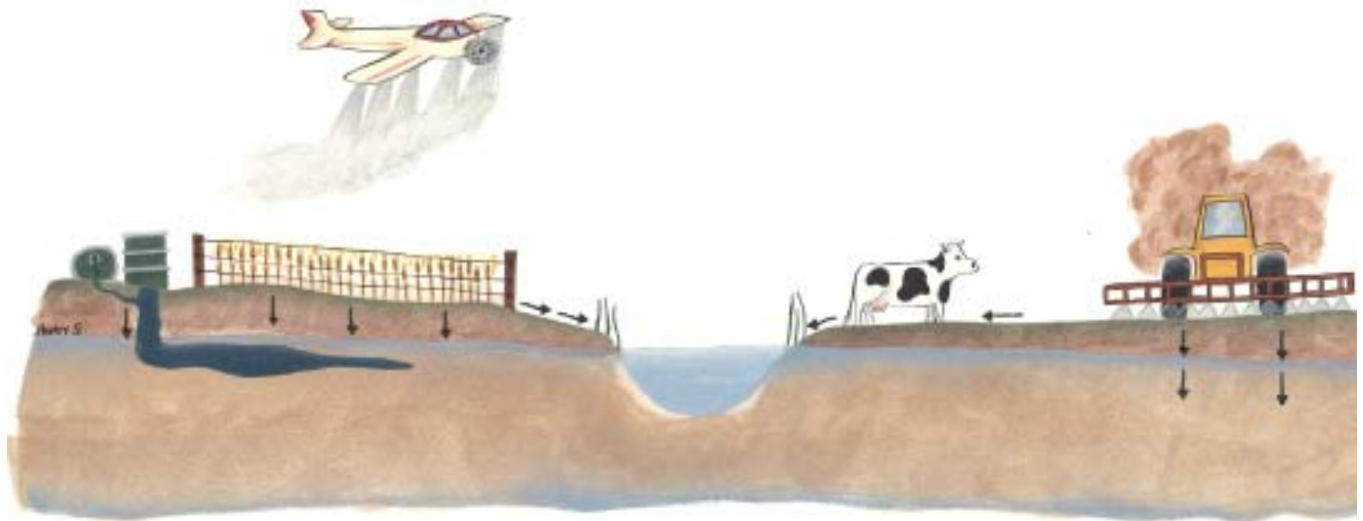
- Sediment is mineral or plant material suspended in water and wind. It can fill in waterways, ruin fish spawning areas, contribute to the transport of plant nutrients which are bound to soil particles and greatly increase the costs of water treatment.
- Nutrients are minerals required for plant growth. They are present in chemical fertilizers, manure and other organic fertilizers such as compost or plant residues. Nutrients can be transported from agricultural lands to surface and ground water. They can produce unwanted growth of algae and aquatic plants and accelerated "aging" of lakes and streams.
- Pesticides are organic compounds designed to kill specific plants and animals. They have become an important part of modern agriculture but pose a potential threat to non-target organisms, including ourselves.
- Disease-causing micro-organisms are present in manure and animal carcasses. They may contaminate runoff water from livestock facilities and become a health concern for humans and other animals.
- Miscellaneous compounds such as fuels, solvents, paints, heavy metals and waste products may be sources of agricultural pollution.



Sediments, nutrients and pesticides may be washed from agricultural land to surface runoff water



Surface and groundwater can be contaminated by agricultural activities



## HOW DO CONTAMINANTS MOVE FROM FARMS?

Contaminants can move into surface water bodies if they are attached to eroding sediments, suspended in air or dissolved in runoff water. Sediments can be transported by both wind and water. Wind also moves odours, which are considered to be a special class of pollutant. Dissolved compounds can leach into ground water supplies.

## WHAT IS A BEST MANAGEMENT PRACTICE?

Not all farms create pollution problems. As well, not all pollution problems are serious. However, the potential for environmental problems to arise due to agricultural activities is well-documented. There are practical ways to ensure that risks to the environment are minimized without sacrificing economic productivity. These pollution-prevention farming methods are known as *Best Management Practices (BMPs)*.

## THREE GENERAL TYPES OF BMPs

- Reducing inputs is an important element of pollution prevention. The less a potentially harmful substance is used in agriculture, the less likely it is to affect other parts of the environment. This applies most directly to fertilizers, manures and pesticides.

Nutrient management is the practice of applying fertilizers and manures only in the amounts that can be taken up by a crop. Applications in excess of these needs have the potential to enter surface and ground water.

The use of herbicides and insecticides can be minimized through 'Integrated Pest Management'.



Proper disposal of pesticide containers is an important part of good practice

This refers to a management strategy that includes an understanding of the target pest and use of a combination of physical, chemical, biological and cultural controls. Proper storage, mixing and handling of pesticides are also essential in minimizing risk to the environment.

- Controlling erosion and runoff is an important best management strategy. Practices such as strip-cropping, shelterbelts and use of cover crops prevent erosion and reduce the movement of nutrients and pesticides from agricultural land. Residue management through conservation tillage and continuous cropping is also effective at controlling erosion, but requires higher inputs of fertilizer and herbicides. A balance between erosion control and protection of water quality may have to be established to maximize conservation.



Farm practices that prevent erosion will help to protect surface water quality

- Barriers and buffers can be planted to intercept and contain contaminants that are being carried from agricultural lands. In most cases, these are strips of vegetation that slow the velocity of runoff water enough for sediment to settle out, water to infiltrate into the ground and nutrients to be taken up by plants.

Grassed waterways, vegetative strips and field borders are examples of buffers that can be used in annually cropped fields.

Where buffer zones surround a stream or lake, they are usually referred to as *riparian buffers*. These strips capture sediment and nutrients from water that is



Grassed waterways act as buffers to trap sediment and nutrients

moving into the waterway from surrounding agricultural lands. The vegetation also stabilizes the banks and shores from the erosive action of the waterway itself.

## LIMITATIONS OF BMPs

Management practices are a powerful tool for protecting water. However, they cannot be expected to solve all water quality problems. Many of the factors which reduce water quality on the Prairies are naturally occurring. Water treatment is necessary to satisfy the water quality requirements of many specific uses. BMPs are the first step in the treatment process.

## THE BIG PICTURE

Sustainable agriculture requires that soil, water and air quality be maintained. Some farm practices have the potential to cause environmental harm, which may affect rural and urban areas alike. Many of the potential negative impacts of farming can be greatly reduced by use of BMPs.

In some cases, adopting BMPs is simply a matter of common sense and carries little or no extra cost, such as proper disposal of hazardous materials. In other instances, significant costs may be incurred. For example, planting of buffers to protect water quality may be costly.

Water is continually cycling. The water that we use has been used before. Producers and consumers, rural and urban people and the public and private sectors, are all responsible for using water wisely and ensuring that the resource is maintained for others. BMPs are one way for the agricultural sector to help preserve water quality.

For more information about *Best Management Practices* see the following **Water Quality Matters** publications: "Protecting Your Water", "Riparian Area Management", "Soil Texture and Water Quality", "Alternatives to Direct Access Livestock Watering", "Nutrient Management Planning" and "Pest Management and Water Quality".

For further information on rural Prairie water quality and treatment technology:

- read the other publications in PFRA's **Water Quality Matters** series;
- visit the PFRA Website at [www.agr.ca/pfra](http://www.agr.ca/pfra);
- read Prairie Water News available from PFRA, or on the Internet at [www.quantumlynx.com/water](http://www.quantumlynx.com/water); or
- **contact your local Prairie Farm Rehabilitation Administration Office**  
(PFRA is a branch of Agriculture and Agri-Food Canada)

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