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Protecting Our Water and Environmental Resources

Land Use

Nonpoint Source Pollution: A Threat to Our Waters

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Just as the name implies, nonpoint source pollution cannot be attributed to any one source. This type of polluted runoff is caused by rainfall or snowmelt water moving over and through the ground. As the runoff moves over the land, it picks up and carries away natural and man-made pollutants, eventually depositing them in lakes, rivers, wetlands, coastal waters, and even our groundwater supplies.

Photo courtesy of Purdue University

Some Sources of Polluted Runoff

- ✓ Acid rain
- ✓ Automobiles
- ✓ Combined sewer overflows
- ✓ Construction sites
- ✓ Erosion
- ✓ Excess fertilizers, herbicides, and insecticides
- ✓ Faulty septic systems
- ✓ Fecal deposits from domestic animals and wildlife
- ✓ Improper disposal of chemicals

Researchers have determined that polluted runoff is the number one cause of water pollution in the United States today. Often, it is not one source of runoff that causes all the problems, but a combination of different sources. Nutrients and eroded soil are the most common pollutants causing degradation of water resources. Along many of Indiana's beaches the water quality has been degraded because of combined sewer overflows and failing septic systems.

There are several categories of pollutants that regularly result from common land use practices. Each type of pollutant can impact our water resources. *(See Table 1 on Page 4.)*

Nutrients. Nutrients are compounds that stimulate plan growth. The two most common nutrients reaching our waters are nitrogen and phosphorous. Under normal conditions, nutrients are beneficial and necessary, but in high concentrations, they can become an environmental concern. Nitrogen contamination of drinking water can cause health problems, including "blue baby" syndrome. Excess nutrients running off the land and reaching surface waters can cause massive algal blooms, the decay of which can create odors and use up most of the dissolved oxygen, which can result in fish kills. Nutrients in polluted runoff can come from a

variety of sources such as agricultural fertilizers, septic systems, home lawn care products, and yard and animal wastes.

Pathogens. Pathogens are disease-causing microorganisms, such as bacteria and viruses, which can be found in fecal waste of humans and animals. Pathogens wash off the land from wild animal, farm animal, and pet waste, and can also enter our waterways from improperly functioning septic tanks, leaky sewer lines and boat sanitary disposal systems. Exposure to pathogens that reach our waters can cause a number of health problems. Because of this, bathing beaches are closed to the public when testing reveals significant pathogen levels.

Sediment. Sand, dirt, and gravel eroded by runoff usually ends up in stream beds, ponds, or lakes, where it can alter stream flow and decrease the availability of healthy aquatic habitat. Poorly protected construction sites, agricultural fields, roadways, and suburban gardens can be major sources of sediment.

Toxic Contaminants. Toxic contaminants are substances that can harm the health of aquatic life and/or human beings. Toxins are created by a wide variety of human practices and products, and include heavy metals, pesticides, and organic compounds like PCBs. Many toxins are very resistant to breakdown and tend to be passed though the food chain to be concentrated in top predators. Fish consumption health advisories are one result of toxins reaching our waters. Oil, grease, and gasoline from roadways, and chemicals used in home, gardens, yards, and on farm crops, are some sources of toxic contaminants reaching our waters.

Debris. Trash is without a doubt the simplest type of pollution to understand. It interferes with enjoyment of our water resources and, in the case of plastic and styrofoam, can be a health threat to aquatic organisms. Typically this debris starts as street litter that is carried by runoff into our waterways.

Thermal. Removal of streamside vegetation, land clearing for development, paved surfaces, shallow water impoundments, concrete canals and other artificial structures can result in heated runoff and elevated temperatures of surface water. Elevated water temperatures can be detrimental to aquatic life and can negatively impact normal life and reproduction cycles.

The Impacts of Polluted Runoff

When polluted runoff is in a toxic form it may kill the plants and animals that inhabit the streams, lakes, and rivers. In fact, pollutants can be directly toxic to animals or plants or can eliminate their food sources. Another impact of runoff may be decreased oxygen levels in the water as the result of increased plant production. That results in reduced animal life in the affected body of water.

Photo source unknown

The economic impact of polluted runoff is felt nationwide. When polluted runoff affects the quality of surface water, water treatment plants must work harder to process the water, especially water used for drinking. In order to do this, the facilities must either be improved or expanded and the number of employees and use of power are increased. This all means that taxes usually need to be increased or leveraged to pay for the added expenses to bring the water quality up to acceptable standards.

Planning with POWER
Project Partners

Purdue Cooperative Extension Service

Illinois-Indiana Sea Grant College Program

Indiana Department of Environmental Management (IDEM)

Indiana Land Resources Council (ILRC)

Indiana Department of Natural Resources (IDNR)

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Other impacts of polluted runoff include lowering the property values of land near polluted waters. Potential beach closures and fish kills also lead to a less than favorable perception of the surrounding area.

Photo courtesy of John Chavez, Indianapolis, IN

How to Control Polluted Runoff

Over the years, scientists and agencies have developed methods for controlling runoff and reducing the impact of development. These methods can be as simple as seeding and mulching bare ground on construction sites, or as complicated as building engineered structures like sediment control basins. Collectively, the goal of these measures is to prevent the pollutants from reaching public waters.

A simple, three-tiered strategy can be used to reduce runoff and prevent pollutants from affecting water quality in your community.

1. Natural resource-based planning can be used to *minimize* runoff, pollutants, and impacts on natural resources by locating development in non-sensitive areas and by providing protection for critical natural resources.

2. Improved site design and use of best management practices can *reduce* the amount of runoff and pollutants resulting from development. Reducing the amount of impervious pavement in new developments and routing water to natural areas and filter strips where water can slowly percolate into the soil are examples of effective ways to reduce the impact of new development. Technological advances are continually being developed that can be used by communities to protect their natural resources while accommodating growth.

3. Remediation measures can be employed to *mitigate* the impact of development when proper siting and design of development are not sufficient to control runoff and pollutants resulting from development. Practices such as retention basins, constructed wetlands, and percolation areas are examples of practices that can mitigate the impacts of development on water resources in your community.

Learn What You Can Do to Prevent Polluted Runoff from Entering Your Waterways

Photo courtesy of US EPA

Since most nonpoint source pollution is caused by land-based activities, each of us may be contributing to the pollution without even being aware of it! Some of the ways you can make a difference include the following:

You Can Make a Difference!

- Place all trash in receptacles; never throw down a storm drain.
- Reduce the amount of pesticides and fertilizers applied to plants and lawns (read the directions carefully).
- Inspect your septic system annually; pump the septic tank every three to five years.
- Pick up after your pets and dispose of wastes in a responsible manner.

- Livestock owners should call their local Soil and Water Conservation District Office, Purdue Extension or the Natural Resource Conservation Service to develop a manure management plan.
- Recycle all used motor oil by taking it to an authorized service station or local recycling center.
- Keep exposed soil areas to a minimum, and seed and mulch the disturbed areas as soon as possible.
- Never pour hazardous products down the drain; recycle hazardous household products at designated sites or on specific recycling days.
- Boat owners should always use marine sanitation devices or pump-out facilities at marinas.

Additional Information

The *Planning with POWER* program can assist you in learning more about polluted runoff and what you and your community can do to minimize impacts to water and other natural resources. To learn more, contact:

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Table 1. **Sources of Polluted Runoff**

	Farm Land	Managed Greenspace (golf courses, recreational areas, parks)	Commercial & Industrial	Residential
Nutrients	Fertilizers	Fertilizers	Acid rain, automotive exhaust	Fertilizers, septic system effluent
Pathogens	Domestic & wild animal waste	Pet & wild animal waste	Malfunctioning/overloaded septic systems and lagoons	Malfunctioning septic systems, pet waste
Sediments	Erosion from fields, stream bank erosion from animals	Erosion from unprotected exposed areas	Construction sites, roadside erosion, road sand	Construction sites, road sand, erosion from lawns and gardens
Toxic Contaminants	Pesticides	Pesticides	Industrial pollutants, automotive emissions & fluids	Household products, pesticides
Debris	Litter, illegal dumping	Litter, illegal dumping	Litter, illegal dumping	Litter, illegal dumping
Thermal	Removal of streamside vegetation	Shallow water impoundments, removal of streamside vegetation	Heated runoff, removal of streamside vegetation, impoundments	Heated runoff, removal of streamside vegetation, impoundments

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