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Stormwater and Non-point Source Pollution

**EXPERT
REVIEWED**

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Stormwater is the runoff that occurs during rainstorms. In natural systems, rainwater is absorbed by the soil or plants on the ground. In a human dominated landscape, impervious surfaces, such as rooftops, driveways, streets, and parking lots, simply divert this rainwater down the slope or gradient. Most neighborhoods have storm sewer systems that take this accumulated stormwater away, usually to a retention pond, lake, or stream. Observe water flow in your neighborhood the next time it storms. Water will flow down your driveway to the street, where it will run down the gutter to the nearest storm drain.

Stormwater can cause problems because it picks up pollutants on the ground and carries them to the nearest water body. Stormwater is not like waste water, which is treated before being released. **Stormwater is unfiltered and untreated.** Anything, including health threatening contaminants, that runoff picks

up is transported directly to your local stream, lake or river.

The pollution, that stormwater carries, is referred to as non-point source pollution. Excessive nutrient loads in rivers, lakes, and streams can promote unsightly and harmful algae growth. Excessive sediment and garbage can ruin the aesthetic and recreational value of our waterways. Communities, using rivers and reservoirs for drinking water sources, must filter these contaminants at great public expense. Pollutants can leak into groundwater, another important drinking water source for thousands of Indiana residents and their families.

Simple Things You Can Do To Reduce Polluted Runoff

Non-point source pollution is caused by all of us. The actions we take (or don't take) during the day contribute to this harmful contamination and degradation of our waterways. There are many small steps that everyone can take that will contribute to a better environment in the places we live.

Conserve water.

When watering your lawn, use just enough water for your lawn. If water begins flowing down the street, you've used too much. Don't hose down sidewalks or driveways, just sweep them. The more water people use, the more potential there is for polluted runoff.

Limit use of pesticides and lawn fertilizers.

Follow the manufacturer's directions when applying chemicals, making sure to only apply

the amount needed. Don't apply chemicals before a large storm event. If you do not allow enough time for absorption, rain will wash it away, polluting the water and wasting your money. Check with your local Purdue Extension Office for details on proper use, safety, and application of pesticides for the home, yard, and garden. Always follow the manufacturers label for proper disposal of excess pesticides and their containers.

Take your car to a car wash.

While washing your car yourself may save a little bit of money, the soaps and wax you use will be washed down the storm drain and into a river, lake, or stream. Car washes dispose of the waste water and pollutants properly. Besides, it'll save some time.

Make sure your car is regularly serviced.

By ensuring that your car is in top working order, you will reduce the possibility of leaking fluids that are potential pollutants.

Dispose of household hazardous waste properly.

Paint, car fluids, solvents, and batteries should never be poured down the drain. Most communities have a waste facility for these products.

Don't litter!

Be sure not to dump paper, wrappers, cigarette butts, or other small items on the ground. These can all be carried by stormwater straight into rivers and lakes.

Dispose of pet waste.

Pet waste is a major contributor of dangerous bacteria as well as nutrients that can lead to harmful algae and plant growth in streams and rivers. By cleaning up pet waste, even in your own backyard, you can remove this harmful non-point source pollutant. The best way to dispose of pet waste is to flush it, which insures it will be properly treated by your local treatment center.

Many of us already do some of these on a regular basis. These are a good start for the average homeowner. For those who want to do more to prevent non-point source pollution and reduce stormwater runoff, there are more intensive activities. These are not necessarily expensive, difficult, or time consuming. Additionally, most of these will save

homeowners money or increase the aesthetics of the property.

Rain Gardens

Many people practice gardening as a hobby. Maintaining and growing a garden is a good way to get exercise, commune with nature, and create something unique. Whether a flower garden or a vegetable garden, this hobby is one of the most common for homeowners. Rain gardens are a way to help manage household stormwater and participate in a gardening-like activity.

A rain garden is simply a garden that is designed to absorb and filter stormwater. They are usually designed to collect most of the stormwater from a house. These gardens are bowl shaped and planted with native water-loving plants. While rain gardens have the ability to hold large amounts of water, they are not ponds or wetlands. They are simply a natural way to retain stormwater and allow it to seep into the ground naturally.

Typically, rain gardens consist of a relatively small area, in some cases only a few dozen square feet, although they can be as big as the property allows. The garden is designed as a bowl-shaped depression that will hold water as it flows in. These gardens can be placed in a naturally low area, or drainage lines can be installed. Either way, rain gardens are most effective when they serve to collect water from a majority of the property, especially the impervious surfaces like rooftops, driveways, and walkways. Drainage can be achieved through piping or surface channels.

Soil type and drainage are very important features to take into account when planning a rain garden. Due to soil compaction around most homes, soil usually needs to be replaced in the garden area. Clay soils, which are characterized by poor drainage, also need to be replaced with soil that drains more easily, typically a mixture of sand and topsoil.

After the site has been prepared, planting is the next step. Plants should be native to the area; this will help reduce maintenance time and cost, as well as attract local wildlife, including butterflies and birds. Many native species, particularly tall grass prairie species, are adapted to these wet habitats and will serve important filtering roles in your rain

garden. After planting, the maintenance cost of a rain garden is minimal. Native species will need little in the way of fertilizer or pesticide application. Weeding of grasses and non-natives is the only real maintenance needed. The other advantage of rain gardens is that they are rarely in need of watering.

Rain gardens have become very popular over the past decade. There are many organizations and agencies who promote rain gardens; these groups offer a number of resources to assist homeowners in building a rain garden. There are free site plans available over the internet, as well as detailed instructions on how to begin construction of a rain garden. Several valuable resources are included at the end of this publication.

Rain Barrels

As the popularity of gardening rises, so does water usage. Many people spend considerable time and effort on their lawns and gardens, watering them extensively. This increased water usage stresses local ecosystems through the increased runoff it produces and increased consumption of local water resources. An estimated 40 percent of household water usage in the summer goes towards lawns and gardens. Rain barrels offer a way for local gardeners and homeowners to conserve water. Rainwater is also better for lawns and gardens, as it does not have the additives that tap water does.

A rain barrel is exactly what the name implies — a barrel that collects rain. More specifically, it is a barrel that collects water from impervious surfaces, particularly roofs, and holds it for later use or to assist in infiltration into the ground. Rain barrels are most often connected to the gutter system of a house, collecting all of the water that hits the roof. The downspout of the gutter system flows directly into the barrel. The barrel has a spigot for a hose attachment, as well as a drain system that will take excess water (e.g. during heavy rains) to the lawn or garden to be absorbed directly into the soil.

Rain barrels can be found commercially at hardware stores and some gardening stores. They can also be purchased over the internet. Preassembled barrels are the most expensive, but the least time consuming, while kits and

homemade barrels are less expensive. Typical barrels hold between 40 and 80 gallons of water. In areas that receive high rain falls, more barrels can be used to provide greater capacity. Also, large houses can produce even more runoff. For instance, a 2,000 square foot roof can accumulate over 40,000 gallons of rainwater a year in Indiana.

Rain barrels do require some commitment to maintain and monitor. A filter should be installed either in the downspout or in the barrel to collect debris. This debris should be cleaned out on a regular basis. Overflow drainage needs to be monitored to ensure proper infiltration and to make sure no water is leaking into the house or foundation. Untended barrels can breed bacteria, mosquitoes, and algae. This can be prevented if the water is used frequently, at least on a weekly basis, and not allowed to sit in the barrel for months on end. The savings that these barrels can produce, as well as the benefits to the environment can make rain barrels a worthy investment.

Porous or Pervious Building Materials

Impervious surfaces are becoming increasingly common, especially in Indiana. Paved areas, roads, parking lots, sidewalks, roofs, and highly compacted soils can all contribute to reduced water quality. These surfaces accumulate rainwater and allow it to flow into storm drains while collecting harmful chemicals, pollutants, and pathogens. Human habitation invariably leads to an increase in impervious surface. However, there are a number of materials that offer more infiltration capacity. These are known as porous or pervious surface materials, and they include brick, crushed stone, sod, and pervious pavement.

Many of these materials are best used in landscaping and home uses. They offer a way to add uniqueness and beauty to a home landscape as well as protect our water resources. Crushed stone and brick can easily be used in walkways and paths. Patios and other backyard structures can include a large amount of unique pervious materials rather than bland cement or concrete. Driveways and home parking lots also offer an opportunity

for use of pervious surfaces. Brick, pervious concrete, and stone are all increasing in popularity for use in driveways and low traffic roads and parking lots. These materials add character and beauty to a home or neighborhood as well as greatly increasing the infiltration capacity of the area. Think about utilizing these types of materials next time you are planning on remodeling, building a new house, or doing some new landscaping.

References

Arnold, C. and M. Beristain. 2002. *Non-Point Source Water Pollution*.

nemo.uconn.edu/publications/index.htm#factsheets

Arnold, C. 2004. *Strategies for Coping with Polluted Runoff. Nonpoint Education for Municipal Officials*

www.nemo.uconn.edu

Brabec, E., S. Schulte, and P.L. Richards. 2002. *Impervious Surfaces and Water Quality: A Review of Current Literature and Its Implications for Watershed Planning*. Journal of Planning Literature 16: 499-513.

Environmental Stewardship for Homeowners. North Carolina Home*A*Syst.

www.soil.ncsu.edu/assist/homeindx.html

Gibbons, J. 1998. *Addressing Imperviousness in Plans, Site Design, and Land Use Regulations*.

nemo.uconn.edu/publications/tech_papers/tech_paper_1.pdf

Stormwater Management for Coastal Homeowners. North Carolina Home*A*Syst.

www.soil.ncsu.edu/assist/cas/stormwater/index.htm

Using Rain Barrels in Northwest Gardening.
www.savingwater.org/docs/rainbarrel.pdf

Wisconsin Department of Natural Resources. Resources on Rain Gardens.

www.dnr.state.wi.us/org/water/wm/dsfm/shore/raingarden.htm

www.Rainbarrelguide.com

www.Raingardens.org.

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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