



REDUCE NONPOINT SOURCE POLLUTION

in Louisiana Waters

A Manual for

Understanding and Preventing Water Pollution

from

Home Sources

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Automobile, ATV and Boat Care

Cars, boats and ATVs represent considerable outlays, and keeping them clean and serviced not only helps show them off, it helps protect that investment. Many Louisiana residents wash and service their vehicles and boats at home. Although this saves money and shows pride, the practice can be an environmental threat if not done properly. Oil, grease and chemicals from servicing your boat and vehicles at home are pollutants if they enter waterways. Soap, road grime and dirt washed off from vehicles and boats also are detrimental to streams.

Vehicle Servicing

Collect used oil in a lidded container and take to local oil recycling collection point (municipal, chain store or local garage). If a recycling station is not available, ask your local elected officials to establish one. Disposal in the garbage is better than pouring it into the drain or on the ground. One quart of oil can pollute 250,000 gallons of drinking water. Drain and bag used oil filters and place in garbage. Wipe up small spills and use oil absorbent for larger spills. Place wipes and absorbent in garbage. Bag and take old parts to recycling stations. Be careful with solvents and parts cleaners because these may contain hazardous materials that need to be brought to hazardous materials collection days or sites.

Antifreeze is poisonous to pets, humans and aquatic life. Do not pour in the drain or leave open where pets, wildlife or children can get to it. It causes a terrible death. Transmission fluids, brake and power steering fluids should be handled carefully. Put used containers in the garbage or recycling if available. Car wax can be hazardous to small children, pets, animals and to water so dispose of old cans or bottles properly and place polishing cloths in the trash or store carefully for future use.

Vehicle and Boat Washing

It is best to take vehicles and boats to a properly equipped car wash where the water is collected and treated if required. These facilities have sumps where the solids drop out of the water, and the discharge goes to the sewer where the waste water is treated before being discharged to any stream. Sediment, oil, grease and road grime all contain chemicals that can harm streams when allowed to run into them. Detergents used in washing vehicles and boats are also harmful to streams and lakes.

If no car wash is available, park the boat or vehicle on the grass away from the street or driveway. This allows the water to soak into the soil, permitting the chemicals to filter out and begin the biodegradation process. Water entering the storm drain will have fewer of the waste materials from the vehicle washing process. Use no more soap or detergent than necessary to prevent these materials from reaching the streams. A small amount of soap will go a long way spread over the water surface. Soap reduces the strength of the surface film on water and can disturb the plant animal ecosystem in the stream. Oil or grease suspended in the soap film will aggravate the problems caused by the soap to the aquatic system in the stream or lake receiving the water. Clean up well and dump any wash buckets well away from the street or drains.



<p>Visit our Web site: www.lsuagcenter.com</p> <p>Author: Margaret H. Frey</p> <p>This project was partially funded by the U.S. Environmental Protection Agency Grant #C9-996102-09-0 through the Louisiana Department of Environmental Quality.</p>	<p>Louisiana State University Agricultural Center, William B. Richardson, Chancellor Louisiana Agricultural Experiment Station, David J. Boethel, Vice Chancellor and Director Louisiana Cooperative Extension Service Paul D. Coreil, Vice Chancellor and Director Pub. 2994-A (10M) 9/07</p> <p>Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. The Louisiana Cooperative Extension Service provides equal opportunities in programs and employment.</p>
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Dissolved Oxygen

Limits on the amount of certain potential pollutants that can enter waterways have been set in many Louisiana water basins, and work is ongoing to complete this process in all of the watersheds in the state. This program, more commonly known as the Total Maximum Daily Load (TMDL) program, strives to set reasonable amounts of pollutants that can be discharged into Louisiana water bodies and still have those water bodies meet their designated uses.

Many bayous, lakes and streams in the state do not meet minimum standards set by the Environmental Protection Agency (EPA) for one or more of their designated uses, such as fishing, swimming or drinking water. The Louisiana Department of Environmental Quality (LDEQ) is charged with implementing the TMDL program as a mechanism to improve water quality in the impaired water bodies in Louisiana. As a result of this program, both point source and nonpoint source contributors may be required to reduce their impact on surface waters.

Perhaps the most common impairment of surface water in many of Louisiana's water bodies is lack of sufficient dissolved oxygen (DO). For example, a river segment might be listed as not meeting its designated use for fishing because the DO levels are below the level necessary for a healthy aquatic habitat during certain times of the year.

Substances, or pollutants, that can reduce oxygen concentrations are often collectively referred to as oxygen-demanding substances. They include organic matter, such as living and dead plant material, sediment and fecal material from animals and humans.

The processes that consume oxygen in normal decay contribute to the oxygen demand; thus, sometimes less oxygen is available for aquatic life. Additionally, increased water temperatures and slow water flow often found in Louisiana waterways help lower the oxygen available for aquatic life. The ability of water to dissolve and hold oxygen decreases as water temperature increases; that is, cool water can contain more dissolved oxygen than warm water.

Sufficient DO concentrations are important because fish and many other aquatic animals require oxygen concentrations in various amounts. Many of the criteria establish DO levels at a minimum of 3 to 5 milligrams of dissolved oxygen per liter of water (mg/l) for the survival and propagation of native fish species. Without adequate oxygen, many fish species may not be present or may be too stressed to reproduce.

Dissolved oxygen in water bodies comes from several sources and is naturally more abundant in some situations than in others. For example, waters that flow at high velocities through variable terrain like rocks, sand, logs, etc. generally obtain much of their oxygen from the air and water interface and subsequent mixing. Another important source of oxygen in waters are microscopic aquatic one-celled plants known as algae.

Individuals, landowners and local governments have a role to play in reducing excessive amounts of organic material and waste that can contribute to DO depletions from entering our streams. For example, many farming industries can reduce animal waste and sediments from leaving their land and entering the creeks and streams by implementing Best Management Practices (BMPs) that reduce the use of fertilizers and other chemicals.

Another reduction measure is to install certain structures or adopt practices that protect streams and tributaries running across or nearby their property from receiving heavy loads of animal waste, sediment and other types of organic material.

Timber harvesters and landowners can prevent some heating of streams and creeks by not cutting trees that shade the banks of water bodies that flow through their property.

Homeowners also can play a role by insuring they are not overusing lawn fertilizers and other lawn chemicals. Those who live in areas that require them to install and maintain an individual



sewage treatment system can play an important role in protecting DO levels by insuring their system is installed properly and maintained according to the manufacture's recommendations.

Homeowner control of organic material from yard and tree clippings also provides reductions in organic waste entering our waterways.

To see more ways you and others can help prevent oxygen depletions in our waterways go to www.lsuagcenter.com and read about Best Management Practices for agricultural commodities and homeowners.

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Fecal Coliform

Pollution sources that do not have a single point of origin and are not introduced into a receiving stream from a specific outlet are considered nonpoint sources of pollution. Nonpoint sources of pollution may include runoff from fields, farms, woodlands, urban lawns and streets. Point sources originate from a stationary or fixed facility from pipe or discreet locations from which pollutants are discharged directly into a water body.

Many bayous, lakes and streams in the state do not meet minimum standards set by the Environmental Protection Agency (EPA) for one or more of their designated uses, such as fishing, swimming or drinking. The Louisiana Department of Environmental Quality (LDEQ) and EPA are implementing the Total Maximum Daily Load (TMDL) program in Louisiana and across the nation to improve water quality by setting reasonable amounts of pollutants that can be discharged into those water bodies while maintaining their designated uses. Both point source and nonpoint source contributors will be required to reduce their harm to surface waters.

Many of the water bodies in Louisiana that are listed as impaired and require a TMDL are polluted with fecal coliform bacteria and do not meet their designated use for swimming. Fecal coliform is a term used to describe bacteria found in the intestinal tract of warm-blooded animals. Surface waters are monitored for the presence and concentration of fecal coliforms. Not all coliforms are harmful to human health; in fact, some fecal coliforms are normal and essential for human digestion. Without them, our digestive system would not function properly.

Why, then, is the presence of the organisms in certain concentrations in water considered to be a pollutant? If fecal material is present in excessive concentrations, the potential is there for other pathogens to be present. Some kinds of coliforms such as E. Coli can be transmitted from cattle to humans or from person to person and may be harmful to human health. Fecal material also contains nitrogen and phosphorus and can result in nutrient over-enrichment of water bodies, which can cause algae blooms and oxygen depletion.

Homeowners in non-incorporated areas of the state who use individual sewage treatment systems (sewage discharge not connected to a city or regional treatment system) can play an important role in reducing the amount of fecal coliform from entering ditches, drains and small creeks near their homes. Individual systems should be checked at least once a month to insure proper functioning. For example, mechanical treatment plants that require working mechanisms such as aerators and/or chlorination should check frequently to insure both are operational.

These systems should be pumped out by licensed contractors every 3 to 5 years depending on use. Homeowners who possess the older septic systems should have them pumped out every few years and follow other recommended practices such as eliminating the flushing of substances like pesticides, chlorine bleach and oven cleaners down the drain. To read more information on maintenance of home sewage systems see the AgCenter fact sheet: Home Sewage Treatment Plant Management.

Livestock producers also can do their part to reduce fecal coliforms from leaving their property by following and installing Best Management Practices (BMPs) on their operations. Livestock producers can get these practices by going to www.lsuagcenter.com and reading about BMPs for beef and dairy producers.



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Fertilizing Lawns to Protect the Environment

A healthy grass cover conserves water and soil and rejuvenates the air. Lawns can reduce summer temperatures around the house by 15 to 30 degrees compared to bare soil. Thus, the absorptive, filtering, protective and moderating quality of a lawn are well worth the inputs to keep it thick and healthy.

Many soils lack good fertility and need our help in maintaining an adequate and balanced level of nutrients. Over-application of fertilizer, however, will result in developing lush, soft turf plants that require more mowing, are more prone to diseases and insects and are more sensitive to environmental stresses.

Of the three major fertilizer nutrients, nitrogen (N) and phosphorus (P) can find their way into ponds and bayous to cause trouble. They will readily degrade the quality of surface water by over-stimulating algae blooms and water weeds. Nitrogen is very soluble and moves freely with the water where there is sandy soil, steep slopes and heavy rain or irrigation. Phosphorous is generally carried on soil clays that are washed away in the surface water. It also can percolate through a sandy soil.

Judicious use of fertilizer will promote healthy turf growth without jeopardizing the environment. One must know what to use, how much to apply, when to apply it and how to properly apply it.

What Fertilizer Should I Buy?

You will need a product that fulfills what's lacking in your soil and is right for your type of grass. Some soils may be too acid for good growth and nutrient availability; they will need lime. A soil test every few years will determine the nutrient status of your soil and any lime requirement. Contact your AgCenter's local agricultural county agent and ask about a routine soil nutrient analysis for your specific lawn.

Without a soil test, you must assume you have a moderate level of nutrients, and this may not be correct.

Homeowners should look for lawn fertilizers that list a protected nitrogen feature. This slow-release N is also listed as water-insoluble, WIN, controlled-release or slowly available. Not all the N will be slowly soluble. Urea nitrogen, ammonium nitrate and ammonium sulfate are water soluble nitrogen forms and give a quick, short-term green up. With a blend of soluble and insoluble N, you will get some immediate greening and sustained feeding for 5 or 6 weeks. This feature is especially important in spring when soils are cool and growth sluggish. Our mid-summer turf can better handle more nitrogen.

An average turf fertilizer will have a high first number (N), low second number (P_2O_5) and a mid-strength third number (K_2O), which is the potassium (K). These numbers are the percent by weight. Some centipede grass fertilizers will have little or no phosphate.

How much should I apply?

Your soil test will accurately tell you what your lawn really needs; otherwise, it's a guess to the average. Most lawns need a total season-wide dose of 3-4 lb/N/1,000 sq ft plus 1 lb P_2O_5 and 1.5 to 2 lb K_2O . Centipede and carpet grasses need half these rates. To apply 1 pound of N, first calculate the amount to spread by dividing the first number on the bag into 100. For example,



using a 16-4-8 fertilizer, $100/16=6.3$; apply 6.3 lb/1,000 sq ft. Never apply more than 1 pound of soluble N in any one month. Calculate application of P₂O₅ (P) and K₂O (K) the same way as N.

The fertilizer bag has a suggested application rate. Do not go beyond the rate in any month's application; you can add more later if you are not yet into the fall.

When Should I Fertilize?

If lime is recommended, apply as directed anytime during the cool months. Lime takes several months to reduce acidity.

We fertilize our warm-season grasses when they are growing and will use the nutrients. This happens a couple of weeks after spring green up and until early fall. Fertilization other than this time frame is either wasteful or harmful to the turf and environment. Centipedegrass is fertilized lightly, at 2 to 3 times per season, and carpetgrass is fertilized only once in spring. St. Augustine grass and zoysiagrass are fertilized 3 times each season, and bermudagrass gets four applications. Avoid much fertilizer in the fall.

How Do I Apply Fertilizer to a Lawn?

Proper application is essential for turf health, attractive growth and minimal harm to the environment. A drop spreader application is more precise and even than a rotary spreader. It allows superior control of granule dispersement. Read operational instructions carefully.

Fill spreaders on pavement where spills can be swept up. After prescribed application, remove extra granules from the spreader and return them to a proper container. Fill and clean liquid applicators and wash spreaders over turf where spills and water would be absorbed. The fertilizer bag may have a suggested opening setting for a particular model spreader. If using this number, try one notch less until you calibrate the spreader; you can come back a little sooner with the next application, but you can't take back an over-application. Shut off the spreader when passing over hardscape walks, bare ground or when making a sharp turn.

Don't fertilize if a heavy rain is expected; however, do water the granules in lightly especially if the lawn has any slope. Avoid using fertilizer near the shoulders of ditches and ponds. When finished, sweep, blow or wash any granules found on the hardscape into the turf.

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Home Sewage Treatment Plant Management

Nearly 25 percent of American homes have an individual or home sewage treatment system. More than 250,000 such systems are in Louisiana. The average household of four generates an average of 900 gallons a day of waste water. Statewide this adds up to more than 225,000,000 gallons a day of waste water. Most parishes in the state permit this water to be discharged to ditches that can run off the property and end up in streams or lakes. This water contains nitrogen and phosphorous, which are nutrients that can cause algae blooms in lakes and streams. If the water is not chlorinated or treated by some other method, it will contain bacteria.

Therefore, it is important to maintain these systems properly and make sure that they are operating as best they can to protect public health and the environment. Systems installed in the past several years are required to have and maintain a service contract that contains an annual inspection/service visit. These contracts are supposed to be continued, and it is important that they get the annual service visit by a trained person. The owner needs to do some inspections and service on the plant throughout the year to assure proper function and to keep the chlorination active.

How Does a Home Sewage Treatment System Work?

Septic Tanks. These are the older systems universally used for many years. They have a single chamber, generally round, of 600 to 900 gallons and operate anaerobically (without oxygen).

The entry and exit pipes are located on opposite sides of the tank below the surface with a baffle around the entry of each pipe to separate the surface into 3 sections. Entering waste water is forced down, and the solids drop to the bottom the tank where they are digested by bacteria and fungi. The solids in the water also are acted on by the biotic agents in the tank to clean the water and kill pathogenic bacteria and viruses in it.

Treated water rises inside the other baffle and exits down the drain pipe to the gravel drain field where final treatment occurs as the water and nutrients are absorbed by the soil.

These systems have several faults. Treatment of the bacteria in the water is poor; nutrient discharge (nitrogen and phosphorous) is high, heavy soils (clay and silt) often cannot absorb the water discharged and a biological mat often coats the soil surface and seals it. The solids build up in the tank and reduce volume and treatment time if not removed periodically.

Mechanical Treatment Plants. Most of the home sewage treatment system installed today fall into this category, although the working mechanisms may differ. Some systems use aerators and others use pumps to aerate the water and move the liquid and solids around. These systems are aerobic (with oxygen), have more than one chamber and are generally rectangular.

This type system kills more of the bacteria and viruses that are found in sewage than the older septic tank system. Because of this, the water may be discharged to the surface in many areas. Caution should still be practiced around this water to protect public health. Nutrients remain high in this discharge and may pose a threat to surface and ground water in areas where many such treatment systems are located. Discharges to lakes or streams should be avoided because this may lead to water postings to prevent swimming and cause eutrophication of the waters. Treatment of discharges by using oxidation ponds, small constructed wetlands or sand mounds will help remove nutrients, kill bacteria and reduce the amount of discharge.



Care and Use of Home Sewage Systems

Size the system appropriately for the number of members in the household. Allow for at least 100 gallons per day per person. There should be at least a two-day detention time in the system. Check with the local health department on local requirements on size, type and site requirements. Hire a licensed and bonded installer who uses a known brand of system. Make sure he offers a service agreement, and check to see that his work is satisfactory. Someone knowledgeable should be on site during installation to see that it is properly done. Get clear instructions on use, inspections and servicing of the system.

Garbage disposals and home sewage treatment systems do not belong together. If you feel you must have one, you should minimize its use and increase the capacity of the system by 50 percent to accommodate the extra load. The tank will need pumping more often to remove the extra solids from the food waste.

Do not pour toxic substances like pesticides, chlorine, bleach or oven cleaner down the drain. Do not use continuous-feed toilet bowl cleaner. Do not use liquid fabric softeners. Flush only toilet tissue, not paper towels or other hard paper goods, sanitary napkins or disposable diapers or other materials that do not break down quickly in water. Avoid sudden increases in volume such as from a hot tub or whirlpool or back flush from a water softener.

Check the system at least monthly to make sure it is running and that the chlorinator is still operational. If you have a surface discharge, check to see if it is mostly clear. A dark, cloudy discharge may mean that the system is not operating or needs pumping. The same is true if there is a noxious smell that was not there previously. In either case, call your service company/installer.

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Household Hazardous Products

Some of the products we commonly use in our homes can be hazardous to human health and pose hazards to the environment. Health problems can be caused by chemicals in some products in our homes – if product warnings and directions for proper use are not heeded. Health effects can range from minor problems, such as irritable skin and watery eyes, to more serious problems, such as burns, poisoning or even cancer. Most products can be safely used if product directions are followed. People get in trouble by using too much of a product or by mixing two products together.

A hazardous household product is a product purchased for residential use that exhibits one or more of the following characteristics.

Flammable/ignitable. Any substance that can be easily set on fire. Examples include gasoline, paint strippers or thinners, furniture polish and some adhesives.

Explosive/reactive. Any substance that can cause an explosion or violent reaction when subjected to heat, sudden shock pressure or contact with an incompatible substance. Examples include fireworks, ammunition and pool chemicals.

Corrosive. Corrosives are substances that burn and destroy living tissues and will begin to dissolve metals when brought into contact with them. Examples include drain cleaners, oven cleaners, some rust removers and swimming pool cleaners.

Toxic. Any substance that can cause injury or death through ingestion, inhalation or skin absorption. Examples include pesticides, heavy metals, corrosives and some solvents.

Radioactive. Any substance that can damage the nuclei of cells, interfering with cell production by changing the genetic cell structure. Examples include ionizing smoke detectors, gas lantern mantles and static eliminators.

Hazardous Product Categories

Automotive products. Almost everything used in the operation of automobiles and other engines is hazardous. Gasoline, diesel, kerosene, motor oil, transmission fluid and other fuels and lubricants derived from crude petroleum and contain chemical additives. Products such as antifreeze, windshield washer fluid, brake fluid, car wax and vinyl cleaner used in the cleaning and maintenance of automobiles are also hazardous.

Household cleaners. Many household cleaners contain organic solvents, strong corrosives and synthetic chemicals. Examples include furniture polish, spot removers, floor wax, oven cleaner, drain opener, rust remover, tub and tile cleaner, dishwasher and laundry detergents.

Home improvement products. This category includes the decorative and protective coating materials and solvents used in the construction and maintenance of buildings. Examples include adhesives, caulk, paint, paint thinner, paint stripper varnish and stain.

Pesticides. Pesticides are substances that destroy or repel plants and animals that human consider to “pests.” This group includes insecticides, herbicides, mildicides, rodenticides, wood preservatives and fertilizers with added herbicides.

Miscellaneous. This category is designated for those products that do not easily fit into the other four categories. It includes batteries, cosmetics, pharmaceuticals, swimming pool chemicals, arts and craft materials, ammunition and fireworks.



Exposure

Exposure to a product may be by ingestion; breathing fumes or dust; or contact with skin or eyes. The potential for harm from exposure depends on the type of chemical, the frequency of exposure or the individual's size weight and health.

It is important to follow label directions in storing and using household chemicals. Always work in a well-ventilated area, and wear protective clothing and gloves if directed. Never smoke or eat while using household chemicals, and always store in original container. Some chemicals will cause a reaction right away, like watery eyes or burning skin. Other problems don't show up until later, like cancer or harm to lungs.

Hazardous Waste

Once products have been used, how do we discard containers or leftovers? The way we manage products can affect the environment. Ingredients in some products can be hazardous to plants and animals. Pesticides such as motor oil washing into a stream can harm fish. Human health also can be threatened if our food, water or air becomes contaminated through improper use or disposal of household products. Again, follow the label directions on disposal. Share leftovers, take to hazardous waste sites or recycle. Never dump or burn hazardous waste. When in doubt, check it out!

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Nutrient Impairments

When many Louisiana residents think of pollution, they think of toxic chemicals emitted from industrial plants or chemicals used along roadways or farms to control weeds and pests.

These materials may have the potential to pollute surface and groundwater if application or discharges violate laws or exceed scientifically set standards. A significant portion of our water pollution, however, comes to our waters in the form of nonpoint source pollution. This type of pollution does not emanate from industrial sources but from the various day-to-day uses of our landscape.

Limits on the amount of certain potential pollutants that can enter waterways have been set in many Louisiana watersheds, and work is ongoing to complete this process in all of the basins in our state. This program, more commonly known as the Total Maximum Daily Load (TMDL) program, strives to set reasonable amounts of pollutants that can be discharged into Louisiana water bodies while assuring that those water bodies meet their designated uses.

Many bayous, lakes and streams in the state do not meet minimum standards set by the Environmental Protection Agency (EPA) for one or more of their designated uses, such as fishing, swimming or drinking water. The Louisiana Department of Environmental Quality (LDEQ) has the responsibility of developing and implementing the TMDL program as a mechanism to improve water quality in Louisiana's impaired water bodies. Both point source and nonpoint source contributors may be required to reduce their impact on surface waters.

Nutrients are often referred to as an impairment or pollutant; however, nutrients are essential elements for all life on earth. How can something essential for growth and reproduction sometime be referred to as a pollutant of concern in our waterways? The answer is nutrients in the proper amounts are necessary, but when too much of these good things are loaded onto landscapes and then released into some water bodies, serious problems may occur.

Excessive algae blooms can be stimulated by an overabundance of nutrients. Nutrient over-enrichment or hypoxia is a major concern in many water bodies of Louisiana, specifically the Gulf of Mexico. Nutrients such as nitrogen and phosphorous can become pollutants. Both are essential for all plant growth and therefore essential for the proper function of ecosystems. Excessive nitrogen and phosphorous concentrations in water, however, can accelerate algae and plant growth in streams and lakes, resulting in oxygen depletion or low dissolved oxygen. When excess nutrients enter a waterway through unnecessary or improper fertilization of lawns, gardens and farms, effluents from sewage treatment plants, and even manure from wildlife and livestock, the potential for overenrichment or hypoxia can occur and result in low dissolved oxygen.

We can all play a role in reducing unnecessary and expensive nutrients in our water bodies by insuring that fertilizers and other sources or nutrients are not overused. Methods to reduce overuse include assessing nutrient needs using soil test results provided by the local extension office that indicate available nutrient levels and the amount of additional elements required for a given crop or garden. Following these recommendations will reduce the amount of unnecessary nutrients, save money and prevent excessive levels from being released into Louisiana waterways. Additionally, homeowners who live in areas that require proper installation and maintenance of an individual sewage treatment system based on manufacturer's recommendations can have a significant role in addressing water quality concerns. To learn more about ways you and others can help prevent excessive nutrients from entering our waterways go to www.lsuagcenter.com and read about Best Management Practices for agricultural commodities and homeowners.

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Permeable Pavement as an Option to Reduce Pollutants in Stormwater Runoff

Stormwater runoff is a concern for both large and small communities across Louisiana. This runoff can contain several pollutants and develops when rain is dropped on the landscape and begins its flow across and through many land-based features both natural and manmade on its way to drains, ditches, creeks, streams and ultimately to our coastal estuaries and the Gulf.

This runoff typically contains substances such as oil and grease, a variety of metals, petroleum, sediments, fertilizers and other pollutants that if not filtered by some method, can cause our water bodies to become impaired. One method for mitigating pollutants in stormwater runoff from some low density development sites, which may include both residential and commercial development, is to introduce an alternative, such as permeable pavement.

Permeable pavements serve as alternatives to standard asphalt and concrete, which are completely impervious surfaces. Permeable pavements allow water to infiltrate or pass through them. Several types of permeable pavements are available, including pervious concrete, pervious asphalt, permeable interlocking concrete pavers (PICPs), concrete grid pavers and plastic reinforced grass pavement.

These pavements are similar in several ways. They usually contain a gravel storage layer underneath the surface pavement, which often doubles for structural support. Permeable pavements are typically targeted for paved areas with low traffic volumes. Some examples of appropriate uses for permeable pavements include patios, residential parking pads, driveways, fire lanes, overflow parking areas and some daily parking areas. For runoff reduction, permeable pavement on flat slopes tends to work better. Deeper gravel layers under the pavement allow for more storage of rainwater.

Permeable pavements are least expensive and work best when located on sandy soils (such as those on coastal barrier islands, coastal plains and in some northern regions of the state), but they have been used throughout Louisiana. Constructing them over clay soils is possible but more expensive. Clay soils tend to shrink and swell and are rather impermeable. The properties of clay make permeable pavements less stable structurally and limit the rate at which water can infiltrate the paving material. However, when permeable pavements are constructed in watersheds with limited construction, they can function over clay soils, such as many of those coastal Louisiana.

Clay soil permeable pavements are designed differently from their sandy soil counterparts. They tend to be deeper, with a thicker gravel storage layer. They usually have an impermeable liner between the bottom of the gravel storage layer and the existing clay soil on site, and they employ an under drain system to release water slowly to the storm drain network. If sited, designed and installed correctly, permeable pavement can effectively reduce peak runoff rates and consequently reduce local downstream flooding. Permeable pavements also reduce the pollution load to streams and water bodies, the likelihood of soil erosion along streams and waterways, and pavement temperature.

Permeable interlocking concrete pavers and concrete grid pavers consist of concrete blocks with gaps between them filled with a permeable material like pea gravel or sand. The blocks rest on a bedding layer of fine gravel, which overlays a layer of coarse gravel. Pervious concrete and pervious asphalt both allow more air in the mix (air entrainment) and omit finer aggregates (sand) than conventional concrete and asphalt. Each also has a rougher look, slightly resembling a rice cake. The rough look is the result of small waterways connecting the surface of the permeable pavement to the gravel bedding layer underneath.



All permeable pavements are more expensive to construct than traditional asphalt. Due to peak runoff reduction, however, the system cost (which includes pavement plus other stormwater features like pipes, another structural BMP, or both) may be lower for the permeable pavement system.

How do they work? Unlike traditional surfaces, permeable pavements allow water to pass through their surfaces. After water migrates through the surface, it temporarily collects in the gravel storage layer. Depending upon the rainfall intensity, rainfall volume and existing soil infiltration rate, rainwater either exits the bottom of the permeable pavement (via soil infiltration or drain pipes beneath the pavement) or it builds up inside the pavement until runoff occurs. Intense rainfalls can produce runoff from permeable pavement, particularly on concrete grid paver systems filled with sand. But when water passes through a permeable pavement, many pollutants can be trapped inside of it or removed as the water passes out of the pavement into the surrounding soil.

How well do they work? North Carolina State University researchers have tested several permeable lots in eastern North Carolina. Each reduced annual runoff volume – measured for several years at a few sites – by at least 60 percent. Most of this water infiltrated into shal-

low groundwater, which helped replicate predevelopment hydrology. This makes permeable pavement an excellent tool for low-impact development. One parking lot, albeit a special case tested in North Carolina for 10 months, never produced any runoff; all rainfall infiltrated the lot. Permeable pavement applications tested for water quality benefits in other parts of NC show that these pavements can reduce concentrations of zinc and copper. There were mixed results for phosphorus and no improvement in nitrogen. In all cases, however, nutrient and pollutant loads entering the storm drain network were decreased because much less water ran off the pavement.

Permeable pavements will function for up to 20 years if they are constructed in areas free of disturbed soil and are regularly maintained. A survey of 48 permeable pavement sites in North Carolina and other Mid-Atlantic states found that permeable pavements built adjacent to active construction zones were far more likely to clog. The study also verified that standard maintenance, such as street sweeping, increased infiltration rates of the permeable pavement tested.

Source: Urban Waterways Series. North Carolina State University Cooperative Extension.

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REDUCE NONPOINT SOURCE POLLUTION

in Louisiana Waters

Pet Waste Management

Every time it rains, the potential exists for thousands of pounds of pet waste to contaminate the waterways of our state. Pet waste that is left on sidewalks, roads, driveways, parks and yards can mix with rainfall and travel to storm drains and surface waters.

The improper disposal of pet waste can result in animal feces becoming a source of run-off pollution in nearby waterways. As pet waste decays in water, it uses up the oxygen and may release ammonia. Warm water with low oxygen levels and the presence of ammonia can be detrimental to the health of fish and other aquatic life. Pet wastes also contain the nutrients that promote algae and weed growth in water. Cloudy, green water is unattractive or even prohibitive for swimming and recreation.

Pet waste also contains bacteria, viruses and parasites that can be harmful to human health, threaten wildlife and contribute to the closure of shellfish beds. A single gram of dog feces can contain 23 million fecal coliform bacteria. Diseases or parasites that can be spread from pet waste include:

- Campylobacteriosis – a bacterial infection causing diarrhea in humans.
- Cryptosporidium – a protozoan parasite carried by many mammals that causes diarrhea, nausea, stomach cramps and dehydration in humans.
- Salmonellosis – the most common bacterial infection transmitted to humans from animals; symptoms include fever, muscle aches, headache, vomiting and diarrhea.
- Toxocariasis – roundworms transmitted from animals to humans. Symptoms include vision loss, rash, fever or cough.
- Toxoplasmosis – a serious health concern for pregnant women and immunocompromised individuals caused by a parasite found in cats feces; flu-like symptoms; can cause damage to brain, eyes and other organs.

Pet owners are encouraged to collect their animal's waste so it will not wash into waterways or storm drains. Storm drains do not connect to wastewater treatment facilities. They drain directly into lakes, bayous, canals and rivers. Pet waste that remains on the lawn can pose a hazard to pets, children playing outside and adults gardening. Collected pet waste can be placed in a plastic bag and disposed of in trash. Empty bread bags or the plastic bag in which the newspaper is delivered are convenient to use.

Use a long handle scooper to retrieve the waste without bending down or getting close to it. Used cat litter and cat waste should be sealed securely in a plastic bag and disposed in the trash. Flushing pet waste down the toilet can contribute to overburdening of the sewer treatment plant in some cities.

Pet waste can be buried in the yard or treated in an underground pet digester in the yard. Bury pet wastes in a hole at least 1 foot deep. Place 3 to 4 inches of waste at the bottom, mix the waste with the soil and cover with at least 8 inches of soil to prevent pets and other animals from digging them up. Burial is not recommended in areas with poor drainage or a high water table.

Pet waste digester systems work the same way septic systems do. These small in-ground systems have two parts: the digester unit with lid and the digester mix. It liquefies the waste and drains the liquid into the surrounding soil. Never locate burial areas or digesters near drinking water wells, surface waters, storm drains or vegetable gardens.

Feeding ducks, geese, gulls and other waterfowl encourages them to stay, overpopulating the area and creating more waste that endangers the water. Nature provides a meal plan for these creatures. In addition to nitrogen and phosphorus in their waste that can cause eutrophication, waterfowl droppings contain high levels of fecal coliform bacteria.



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REDUCE NONPOINT SOURCE POLLUTION

in Louisiana Waters

Rain Gardens

Rain gardens are an attractive way to protect water quality and increase the groundwater supply. A rain garden is a shallow depression designed to collect rain from impervious surfaces such as roofs, streets, patios and driveways. The plants in the rain garden slow the flow of water, which allows pollutants to settle out and the water to infiltrate the ground. Nutrients in the water also can be used by the plants instead of continuing to flow away.

Rain gardens vary in size and depth. They can be installed in the corner of the lawn, along the edges of roads or in natural drain areas of a lawn. The size and design of the rain garden depend on the size of the area that drains to it and the type of soil in the garden. The bowl of the rain garden ranges from 3 to 6 inches deep. The depth varies according to the rate at which the water sinks into the soil. If the site holds water, make the depression shallow to reduce the water volume trapped there. If water soaks quickly into the soil, however, make the garden deeper to increase its storage capacity.

Whatever the depth of your garden, be sure to keep the bottom level so that water spreads out. To minimize digging or to capture runoff from several parts of your lot, you might want to take advantage of low-lying areas in the yard that naturally collect water. Placing plants in such spots will help dry out those areas and attractively transform muddy messes.

It is essential that your rain garden be at least 10 to 15 feet away from the foundations of the house and “down slope” so the water won’t simply drain back onto the foundation or crawl space! Avoid having a rain garden very close to large trees because the water can rot the tree roots.

You can use existing low areas in the yard, follow a natural contour or design a rain garden in a new or redone landscape. Size it to handle all the runoff from the hard surfaces. You can increase the volume by digging down 18 to 24 inches and filling the area with several layers of materials. Start with a gravel base, followed by a layer of coarse sand, then a layer of compost and topsoil, and finally a deep layer of mulch. If you are going to excavate, be sure you know where the gas, electricity and phone lines are buried!

A rain garden can be a beautiful landscape feature rather than just a dent in the ground that sometimes fills with water. Select plants that have deep roots that will help with soil retention and allow the water to drain away slowly. Neatly trimmed shrubs, a crisp edge of lawn, stone edging and other devices can be used to keep garden edges neat and visually appealing.

Not every plant can survive in a rain garden, but it is possible to design themed rain gardens such as evergreen rain gardens or butterfly rain gardens. Varieties of native species plants that are both wet- and dry-tolerant are best suited. Daylilies seem to do well as part of a rain garden, and plants that grow naturally in your area are more likely to attract butterflies and birds. Native plants vary depending on the area in which you live. Some examples for southern Louisiana include Carolina jessamine, Dahoon holly, Sweet bay, Southern wax myrtle, Dwarf palmetto, Louisiana iris, giant coneflower and maidenhair fern.

Mulch is an important component of the rain garden. It helps provide a distinctive look, keeps the weeds controlled and acts as a sponge to capture metals, oils and grease. As the mulch decays, bacteria and plant roots break down the pollutants.

A rain garden can be both a delightful landscape feature and an environmentally responsible project.



Visit our Web site:
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REDUCE NONPOINT SOURCE POLLUTION

in Louisiana Waters

Safe Storage of Household Hazardous Waste

Leftover or used chemicals such as strippers, paints waste oil, used antifreeze and solvents may need to be stored until their next use or disposal. How and where you store household products can determine how much risk may be present.

Are Your Storage Locations and Containers Really Safe?

When storing household products, the primary concerns are child safety, indoor air quality, water contamination and prevention of damage to household equipment or the environment. If you can smell a household product while it is in storage, the container lid may be loose or ventilation may be inadequate to protect your health.

When you store household products, do you:

- Keep them out of the reach of children and pets, preferably in a locked, secure area?
- Store them in their original containers?
- Clearly label and date any alternative containers?
- Keep containers tightly sealed and dry?
- Store products at least 150 feet from a well or waterway?
- Keep products in a well-ventilated area and away from sources of ignition?
- Store batteries and flammable chemicals in an area shaded from direct sunlight?

Use and store potentially hazardous products as far as possible from a private well. Do not use a well house to temporarily store home pesticides or other hazardous products. Use care when using lawn or garden pesticides if your well is less than 100 feet away or if it is downhill of the application area. Immediately clean up oil, antifreeze, fuel or solvent spills.

Be sure to separate corrosives like acids or lye from each other and from other hazardous products to prevent dangerous chemical reactions. Reactions occur when corrosives leak from their containers and drip or flow to other products. Corrosive materials are often stored where equipment and appliances are located; be aware that they can corrode air conditioning and heating systems, hot water heaters and other equipment or appliances. Routinely check areas where you store household products (under the kitchen sink, in the basement or garage) to make sure that containers are closed tightly and not leaking and that the sides of containers are not bulging.

Unless a product is used up, you will have to dispose of it. For some products that are especially hazardous — like pesticides — even the product container will have to be disposed of properly. In Louisiana, some hazardous wastes from individual households are banned from disposal in municipal solid waste landfills. These include lead-acid batteries, used oil, whole waste tires and small-sealed lead-acid batteries. Some of these items can be taken to your local recycling or convenience center. Items accepted for recycling can vary in each city and parish. Check with your local center before bringing items to it.

You may be able to donate leftover paint, household cleaners or other products to local charity, church or service organizations. Theater groups, the local housing authority or nonprofit organizations such as Habitat for Humanity may be able to use small quantities of useable paint or cleaning products.



What Is The Best Way to Dispose of Leftover Hazardous Products?

Disposal should be your last option because it is wasteful and, if not done properly, can be unsafe for you and the environment. You can avoid the disposal dilemma by buying only what you need, using up your leftovers or recycling. By giving leftover products to a neighbor or local organization that can use them, you can turn a potential waste problem into a cost-saving opportunity. Some communities sponsor swap programs to encourage sharing; options for recycling are increasing. Used motor oil and batteries, for example, are accepted for recycling in many automobile repair shops and recycling center sites. Some pesticide containers may be returned to where they were purchased for safe disposal.

Some cities and communities sponsor occasional or permanent household hazardous waste collection programs. Because only certain hazardous products may be accepted, contact the program to learn exactly what materials are accepted. Household quantities of some products can be safely sent to a landfill. For example, leftover paint — if local regulations permit — can be evaporated in its can. When dry, the can with its hardened contents can be discarded in household garbage.

Paint and Pesticides Merit Special Attention

We all buy too much paint. Municipalities that collect leftover hazardous household products report that paints make up about half of the material that people bring and thus are a costly (but avoidable) disposal expense. The best practice is to avoid leftovers by calculating how much paint you'll actually need before you buy. Salespeople at paint stores can help you with these calculations. Most leftover paint can be safely managed by sharing it with neighbors or organizations. However, leftover lead-based paints or exterior paints containing mercury or pesticides should be treated as hazardous waste.

We don't pay enough attention to how we manage pesticides. A 1992 Environmental Protection Agency study of pesticide use in homes and gardens provided disturb-

ing information about how pesticides are used, stored and thrown away. Household practices showed that people fail to recognize the danger that pesticides can pose to child safety, human health or the environment when managed improperly. Before you choose a pesticide, be sure you have exhausted other options for controlling the pest, weed or fungus problem. If you do need to use a pesticide, read label information carefully before purchasing a product. Buy only what you need. Pay attention to use and disposal recommendations described on labels. Before disposal, use up the product if possible. Rinse empty containers of liquid pesticides. Use the rinse water as part of your yard and garden management.

To reduce your need for pesticides in the home:

- Maintain regular cleaning habits, especially in the kitchen.
- Caulk cracks and other openings to the outside.
- Keep screens repaired.
- Keep houseplants healthy by providing appropriate care.

Is Dumping or Burning a Safe Alternative?

It's never appropriate to dump or burn hazardous products on your property, particularly near wells or water sources. Nor should products be poured down storm sewers. Water-soluble cleaning products may be safely disposed down the drain if you flush the drain with plenty of water. Septic system owners need to be especially careful, however. With septic systems, the rule of thumb is moderation. Don't dump large amounts of anything into the septic system. Septic systems are not designed to treat chemicals. If the product is specifically designed to be used in the home with water, moderate use will not harm the system. Burning hazardous wastes in a barrel or stove is never an alternative, and it's illegal in many states. Burning may release toxic gases and produce hazardous ash.

Source: *Clemson University, South Carolina Home-A-Syst.*

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REDUCE NONPOINT SOURCE POLLUTION

in Louisiana Waters

Sedimentation Impairments

Limits on the amount of certain potential pollutants that can enter waterways have been set in many Louisiana water basins, and work is ongoing to complete this process in all of the watersheds in the state. This program, known more commonly as the Total Maximum Daily Load (TMDL) program, strives to set reasonable amounts of pollutants that can be discharged into Louisiana water bodies while assuring that water bodies maintain their designated uses.

Many bayous, lakes, and streams in the state do not meet minimum standards set by the Environmental Protection Agency (EPA) for one or more of their designated uses, such as fishing, swimming or drinking water. The Louisiana Department of Environmental Quality (LDEQ) has the responsibility of developing and implementing TMDLs as a mechanism to improve water quality in the impaired water bodies. As a result, both point source and nonpoint source contributors may be required to reduce their impact on surface waters.

Sediment is the largest pollutant by volume of surface water in the nation. Sediment comes from agricultural sources, construction sites and soil-disturbing activities in urban settings that leave the soil exposed to rainfall. Sediment increases with the turbidity of water, thereby reducing light penetration, impairing photosynthesis, altering oxygen relationships and may reduce the available food supply for certain aquatic organisms. It can adversely affect fish populations in areas where sediment deposits cover spawning beds. Increased sediment also fills lakes and reservoirs.


Sediment directly damages water quality and reduces the usefulness of streams and lakes in many ways. Problems include damaged fish spawning areas, reduced light penetration for aquatic life, increased water purification costs, lower recreational value, clogged channels that increase flooding, increased dredging to maintain shipping channels and reduced storage capacity for reservoirs.

In addition, sediment is often rich in organic matter. Nutrients such as nitrogen and phosphorous and certain pesticides may enter streams with sediment. The potentially harmful effects of these substances accompanying the sediment may include rapid algae growth, oxygen depletion from decomposing algae and organic matter, fish kills from oxygen depletion, toxic effects of pesticides on aquatic life and unsafe drinking water caused by nitrate or pesticide content.

To get details on ways homeowners and agricultural producers can reduce sediment runoff to our waterways go to www.lsuagcenter.com and read about Best Management Practices for agricultural commodities and homeowners. Also, refer to the Louisiana Yards and Neighborhoods handbook.



<p>Visit our Web site: www.lsuagcenter.com</p> <p>Authors: Brian LeBlanc and Carrie Castille</p> <p>This project was partially funded by the U.S. Environmental Protection Agency Grant #C9-996102-09-0 through the Louisiana Department of Environmental Quality.</p>	<p>Louisiana State University Agricultural Center, William B. Richardson, Chancellor Louisiana Agricultural Experiment Station, David J. Boethel, Vice Chancellor and Director Louisiana Cooperative Extension Service Paul D. Coreil, Vice Chancellor and Director Pub. 2994-L (10M) 9/07</p> <p>Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. The Louisiana Cooperative Extension Service provides equal opportunities in programs and employment.</p>
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