

# BE ON THE TEAM TO THINK DOWNSTREAM: PHOSPHORUS

## WHAT IS PHOSPHOROUS?

Phosphorus is a chemical element that is essential for all living organisms. There are many different forms that can come from various sources, including fertilizers, pesticides, natural organic matter and soap products. Phosphorus is less bioavailable due to its binding affinity to soil. If soil is eroded or transferred as fine particles in runoff to aquatic systems, it can be broken down, thus releasing phosphorus into the water.

Phosphorous can enter canals through both natural landscapes and anthropogenic inputs. Photo by M.P. Hayes



## WHAT AFFECTS THE PARAMETER?

Soil characteristics and landscape features impact phosphorus leaching and runoff because different soils have varying capacities to bind phosphorus, affecting its mobility and availability. Rainfall and irrigation practices can wash phosphorus into waterways. In addition, urban-

ization and deforestation can increase phosphorus runoff due to changes in impervious surfaces and drainage patterns. Synthetic fertilizers, pesticides and soap products may also increase concentrations of phosphorus in waterways if not used responsibly.

## WHERE DOES IT COME FROM BROADLY AND SPECIFICALLY TO LOUISIANA?

There are minimal phosphorus impairments classified in the state, but this is due to the immediate consumption of phosphorus in environmental systems. Many living organisms and aquatic plants use phosphorus as a nutrient source. This means that phosphorus impairment may be represented by dissolved oxygen depletion or invasive plant growth. Commonly linked to agricultural runoffs such as fertilizers and manure applied to crops, leaching occurs during persistent rain events through runoff. Other natural sources of phosphorus include weathering of rocks and soil erosion. It can also come from urban runoff like residential and industrial areas, through lawn fertilizers, pet waste and untreated stormwater. Addition-

ally, effluents from sewage treatment plants and septic systems contain phosphorus from human waste, detergents and industrial processes that may end up in the water supply. The Louisiana Department of Environmental Quality uses the Water Quality Integrated Report to identify impairments and sources. The following sources were identified as causing phosphorus impairments around the state:

- Natural source
- Industrial point source discharge
- Introduction of non-native organism (accidental or intentional)

## HOW DOES IT AFFECT THE SURROUNDING ENVIRONMENT?

Excessive phosphorus in waterways can promote the growth of algae and aquatic plants, leading to algal blooms that deplete oxygen levels. The enrichment of a waterway with nutrients is called eutrophication and can lead to hypoxic conditions or “dead zones” where oxygen is depleted. Low oxygen levels can lead to fish kills and harm other aquatic organisms, disrupting eco-

systems. These conditions can persist in any size waterway from small ponds to the Gulf. The conditions can be intensified by warmer temperatures, increased microbial activity, and a sufficient concentration of dissolved oxygen. Excessive phosphorus can also alter soil chemistry, potentially leading to deficiencies in other essential nutrients for plants.

## WHAT ARE TRADITIONAL MANAGEMENT PRACTICES?

Residential homeowners should understand that soil characteristics and landscape features impact phosphorus runoff into surrounding ponds and waterways. Impervious surfaces and drainage patterns can lead to soaps, fertilizer and pet waste making it into downstream systems. Additionally, improving wastewater treatment processes to remove phosphorus more effectively before discharge is a best practice for Louisiana residents. To prevent excess nutrient release, it is encouraged that individual septic systems in residential areas should be inspected every six years after installation and pumped every eight years or as necessary to ensure the most efficient treatment for septic systems. In agriculture, the management practices for nutrients like phosphorus involve implementing plans to optimize fertilizer use and reduce runoff, including soil testing and precision agricul-

ture techniques. It is critical to carefully read instructions to determine the proper concentrations of fertilizers, timing of application and crop types that influence nitrogen runoff. Rainfall and irrigation practices can wash phosphorus into waterways, especially in the case of overapplication. Planting cover crops to absorb excess nutrients and prevent soil erosion during off seasons, while reducing tilling, can also reduce erosion. Establishing vegetative buffer strips along waterways and crop fields to intercept and filter runoff before it enters water bodies. In Louisiana, especially, restoring wetlands to naturally filter and absorb phosphorus from runoff helps reduce nutrient impairment. For additional recommendations, the LSU AgCenter’s Soil Testing and Plant Analysis Lab can provide a service lab platform for sample analysis and recommendations for various nutrients concentrations.

## RESOURCES

<https://www.usgs.gov/special-topics/water-science-school/science/phosphorus-and-water>

<https://www.epa.gov/national-aquatic-resource-surveys/indicators-phosphorus>

<http://www.deq.louisiana.gov/page/louisiana-water-quality-integrated-report>

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P3975-I (online) 12/25

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