



**It's Your Bay-  
Protect It!**



**Virginia Cooperative Extension**



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## THE CHESAPEAKE BAY, A LIVING TREASURE

We are fortunate to live near the Chesapeake Bay, one of the largest and most productive estuaries in the world. Its annual harvests of millions of pounds of seafood are legendary, satisfying both domestic and foreign market demand for oysters, crabs, and other commercial aquatic species. It has served for centuries as a commercial shipping center and is also a recreational center, offering boating, fishing and wildlife attractions to shoreline residents and millions of visitors a year. But at the same time it is constantly being threatened by man's use and abuse of fertilizers, pesticides and other pollutants. As stewards of the Bay, we are responsible for maintaining this truly unique national treasure.

The Chesapeake drainage basin encompasses over 64,000 square miles of land in six states and the District of Columbia. Over 150 rivers, creeks and branches in this watershed contribute freshwater to the estuary. Of the 50 rivers that flow into the bay, six are considered major and four of these are in Virginia (the Potomac, the Rappahannock, the York and the James). With this freshwater supply comes sediment, nutrients, metals and organic chemicals which can all contribute to the pollution of the Bay. How we manage the land in the Chesapeake watershed largely determines the volume and types of chemicals included in this freshwater discharged to the Bay.

## **THE PROBLEM: THE BAY IS DYING !**

Each year, millions of tons of pollutants are dumped into the Bay via the rivers and streams that flow into it. Many of these pollutants are from point sources, that is, sources that are defined as directly contributing to the pollution, such as factories and sewage treatment plants. A major source, however, are non-point sources, ones that cannot be singled out but are known polluters. Agricultural endeavors can be major non-point sources of Bay pollution. Farms have typically been assumed to be the largest contributor to nitrate and pesticide pollution, but in recent years it has been found that others, such as nurseries, turf areas and homeowners all are capable of unknowingly contributing to this problem.

Since some soils leach more easily than others, turfgrass and landscape professionals need to have a working knowledge of the characteristics of their soil to accurately determine when to fertilize and apply pesticides. Nutrient leaching into groundwater is a problem if the quantity of fertilizer applied exceeds the amount the plant can utilize. Applying fertilizer when the plant is actively growing and can utilize the nutrients is not only an ecologically sound practice, but it can save money! Turf managers need to be environmentally aware and take factors such as irrigation, soil structure, nitrogen source and pest identification into consideration before applying nutri-

ents or pesticides. Homeowners cannot just go for the "quick fix" when applying fertilizers and pesticides. We all must consider the consequences of what effect our application of chemicals is going to have on what happens "downstream."

## **WE ALL LIVE DOWNSTREAM !**

### **Groundwater and Surface Water Protection**

Groundwater presently accounts for 50 percent of the nation's drinking water and, in rural areas, over 95 percent of the population relies on it for their water supply.

#### **What is Groundwater ?**

Water that occurs in the earth below the depth to which water will rise in a well is considered groundwater. Below this level all the pore spaces between the solid particles are filled or saturated with water. Groundwater occurs in porous deposits such as limestone or sands and gravel. In some cases, especially in eastern Virginia, groundwater can occur within a few feet of the soil surface. It was once thought that water filtering down through the soil, called recharge, would be cleansed of all impurities before it reached the groundwater. We know now, however, that this is not true.

Water carrying dissolved materials moves downward from the surface of the

soil through the unsaturated zone to the saturated zone. The time it takes to do this can be only a few days in humid regions where the saturated zone is close to the surface, the soil is readily permeable to water and the precipitation (or irrigation) is excessive. In arid areas this process may take centuries.

## CHEMICAL CONCERNS

Many chemicals can be considered as potential contaminants of our surface and groundwater supply. These include pesticides, landfill leachates, petroleum products such as solvents, gasoline and oil and nitrates from septic systems and fertilizers. Nitrate from fertilizer leaches down through the soil very easily and reaches the groundwater. Nitrates in water have been associated with a number of health problems, most notably methemoglobinemia or "blue baby syndrome." This causes the blood to not carry oxygen as efficiently and can lead to death of the infant that drinks water that is high in nitrate.

Nitrogen and phosphorus from fertilizers have also been associated with many environmental problems, including excessive eutrophication (which leads to algae growth) of surface waters and groundwater pollution. Eutrophication renders water less desirable for recreation and as the algae die, they deplete the water's oxygen supply, suffocating marine organisms.

## THE SOLUTION

Water quality problems related to agricultural chemical use can only be resolved through a more holistic approach to agricultural management. What we do to the soil and water impacts the health of the bay. Standard concerns for soil conservation and surface water quality must be coupled with the need to protect groundwater. Added to this should be a knowledge of the role properly managed turf areas can play in maintaining high water quality. New combinations of many current practices may be needed, and better nutrient and pesticide management must also play a part.

Nutrients can enter groundwater by percolation and are carried with runoff into surface waters. Conservation practices which control runoff and erosion also prevent nutrients from entering waters.

### The Water Cycle

Groundwater and surface water are both parts of the natural hydrologic cycle of water in the environment and as such, are closely related. In this cycle, water in the atmosphere moves to the earth's surface, either by natural precipitation or irrigation. Once on the earth's surface the water evaporates, is transpired by plants, runs off or moves into the ground and eventually back into the atmosphere. Much of the runoff naturally goes

into our surface waters, as streamflow is largely affected by such things as runoff and precipitation. The base flow of many streams, especially those that run year-round, comes from groundwater. In this case, if the groundwater is polluted, the stream is at risk. At the same time, water from a polluted stream can contaminate the groundwater. These natural interactions demonstrate the need and importance of maintaining high quality surface and groundwater supplies. Every Virginian should be aware of his or her role in protecting our water supplies.

For many years it was thought that the natural filtering of water as it moved through the soil, sand, gravel and rock formations was all that was needed to cleanse the water of pollutants and other impurities before it reached the groundwater. Recently, however, many chemicals, including pesticides and nitrates, have been detected in groundwater.

### **Turfgrass Management Practices to Minimize Pollution of Groundwater**

- Use slow-release nitrogen on sandy soils
- Apply water-soluble nitrogen in split applications at reduced rates
- Never apply more than 1 pound of soluble nitrogen per 1,000 sq. ft.
- Apply fertilizers as indicated necessary by soil test or plant tissue analysis
- Use conservative irrigation practices - Water to only slightly below the

## rooting depth

- Apply nutrients at time of year best suited to ornamental plant or turfgrass need
- In turf, select varieties that are darker green and require less nitrogen and water
- Return clippings when mowing and mow with the proper frequency
- Increase mowing heights to allow better root growth
- Properly identify pests and select pesticides with minimal non-target toxicity and mobility
- Use safe delivery systems
- Calibrate equipment frequently and apply pesticides safely
- Practice Integrated Pest Management (IPM) by spot treating, using curative programs and establishing damage thresholds

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