

# The Susquehanna and the Chesapeake Bay

## THE SUSQUEHANNA: LIFELINE TO THE BAY

In 1736, Susquehannock Indians living in a river valley near the Chesapeake Bay sold some of their land to white settlers. The Susquehannocks have long since vanished, but their namesake, now called the Susquehanna River, still flows, adding an astonishing 19 million gallons of freshwater to the Chesapeake every minute.

The 444 mile-long river draws its strength from a 13 million-acre drainage basin. This watershed, second largest in the eastern United States, encompasses over half the state of Pennsylvania as well as parts of New York and Maryland. Beginning as an overflow of Otsego Lake, near Cooperstown, New York, the Susquehanna flows south through towns and dairy land, coal fields, farms, and forest. At Northumberland, in central Pennsylvania, the river is joined by its main tributary--the West Branch Susquehanna. Forty miles farther south the mile wide Susquehanna flows past Pennsylvania's capital city of Harrisburg. At Havre de Grace, Maryland, the Susquehanna empties into the Chesapeake Bay, the drowned river valley of the ancient Susquehanna.

Though broad, the Susquehanna is not a deep river and so is not suited to commercial navigation. Nevertheless people use the Susquehanna in a variety of ways; it turns the turbines in several hydroelectric plants, cools the uranium rods in nuclear power plants (including the Three Mile island station), provides drinking water for millions, and is a summer playground for canoeists, sport fishermen and inner tube riders. The West Branch Susquehanna flows through some of the wildest parts of Pennsylvania; millions of sportsmen from many states come to hunt or to fish along its banks for largemouth bass, walleye, or muskellunge. The Pennsylvania Fish Commission, which stocks purebred striped bass in the lower portion of the river, also is currently engaged in a shad restoration project in the Susquehanna.

Yet despite its many attributes, the Susquehanna has gained its greatest notoriety, for the damage it does when it floods. Over forty, serious floodings of the Susquehanna have been recorded since 1736. In an average year, the great rush of water from the Susquehanna accounts for over half the freshwater flow into the Chesapeake Bay. Thus, the health of the Bay, particularly its upper portion, is closely tied to the Susquehanna's water quality. Unfortunately, the health of the Chesapeake has been in decline for some time.

This fact sheet examines how the Susquehanna, and in turn the Bay, becomes polluted. It also outlines some of the steps state and local governments are taking to reduce river pollution. The push is on to clean up the Bay, but it won't happen unless Pennsylvanians continue to do their part to clean up the Susquehanna. Read on to find out how you can help!

## PEOPLE AND PROBLEMS

The population in the Susquehanna basin increased by 19 percent--more than half a million people--between 1950 and 1980. Changes in land use have accompanied this population growth. Areas of forest as well as cropland and pasture have all decreased, while the amount of space taken up by homes and businesses increased. All of these kinds of land use (with the exception of uncut forests) can contribute to river pollution.

The Susquehanna's pollutants fall into three broad categories--nutrients, sediments, and toxics. Nutrients include nitrogen and phosphorus which are applied to crops as fertilizer or manure. Farmers in the Susquehanna basin have historically applied a great deal of fertilizer to their crops. According to a recent Pennsylvania Department of Environmental Resources report,

farmers also tend to over fertilize their land with excessive manure applications. In many situations, there is simply no other place to dispose of the waste. In an average year, more than 60 percent of the phosphorus and 85 percent of the nitrogen found in the Susquehanna can be traced to non-point sources of pollution, such as farm runoff.

Another source of excess nutrients is the discharge from sewage treatment plants. Plants that do not employ nutrient control measures may release large amounts of phosphorus and nitrogen into the waterways.

Altogether, the nutrients that are introduced into the Susquehanna make up 21 percent of the phosphorus and 40 percent of the nitrogen that is found in the Chesapeake Bay.

Once in the water, nitrogen and phosphorus can stimulate excess algal growth. As the algae die and settle to the bottom of the river or Bay, they decay and consume the oxygen needed by fish and other waterlife. Thick growth of algae also cuts down on the amount of sunlight in the water, which inhibits the growth of submerged aquatic plants needed by fish (and other animals) for food and shelter.

On land, nitrogen can leach into the soil and contaminate the groundwater--the water supply for over a million people in the Susquehanna River basin .

A second major pollutant in the Susquehanna is sediment. The land in the lower Susquehanna basin is intensively farmed, and conventional tillage--whereby the soil is disturbed at the time of planting and harvesting--is common practice. According to the Soil Conservation Service, erosion in the Susquehanna basin is very high--over seven tons of soil per acre of cropland are lost every year. Certain critical areas lose almost 18 tons of soil per acre per year! Construction sites in more urban areas can also accelerate erosion. The net result of such erosion is an increase in sediment, which clouds the water, blocks sunlight, and cloaks fish spawning habitat in layers of silt.

In addition to excess nutrients and sediment, 12,531 pounds of toxic metals flow through the Susquehanna each day, according to EPA's Chesapeake Bay management study. Toxic metals in the river include cadmium, chromium, copper, nickel, and zinc. Industry and municipal wastewater treatment plants discharge toxics including metals and chlorinated organic compounds into the water while the atmosphere and urban stormwater runoff from city streets can add lead and zinc to the toxic mix. Farms also can contribute toxics to the Susquehanna in the form of pesticides and herbicides.

Toxics in water tend to attach to suspended particles, drop to the bottom, then re-suspend during storms. Toxics lower reproductive success and stress the health of aquatic animals. When toxics accumulate in the tissues of fish and shellfish, they pose a threat to human health. Toxics may also seep into the water table and contaminate vast amounts of groundwater.

## **CLEANING UP**

In the past, the emphasis in water quality improvement was on eliminating point sources of pollution such as sewage and industrial discharge. Between 1979 and 1985, Pennsylvania spent 229 million for the construction of 61 municipal sewage treatment projects in the Chesapeake Bay drainage area of the state.

Although point sources of water pollution continue to be a problem in the Susquehanna, nonpoint sources such as storm water runoff, mine drainage, agricultural runoff, and runoff from

construction sites, are receiving increased emphasis in current pollution control drives.

In 1984 Pennsylvania initiated its Chesapeake Bay Program. The major thrusts of this program are education and financial and technical assistance aimed at keeping soil and nutrients on the land. The program's administrators promote the use of best management practices (BMPs) such as no-till farming, appropriate manure and fertilizer applications, grassed waterways, terracing, and other erosion-reducing measures. Farmers using these methods will not only slow soil erosion and fertilizer runoff, but may save up to \$2,000 a year on a typical Susquehanna basin farm, according to Pennsylvania's Department of Environmental Resources. One of the largest sources of river pollution--runoff from city streets--has not been given high priority in either Federal or state water quality laws. Regulations are few and often are not strictly enforced. However, a survey of stormwater runoff from 28 urban and suburban sites conducted by the Environmental Protection Agency indicates that sidewalk and street cleaning and proper trash disposal are the simplest and most effective ways to reduce runoff pollution. Control of erosion at construction sites is covered by Pennsylvania's Clean Streams law, which requires an erosion control plan for any land-disturbing activity. However, a three year evaluation of Pennsylvania's erosion and sedimentation control program revealed that although a high percentage of inspected sites had an erosion control plan, almost half of those were rated as poor to fair in implementation. Ultimately, the condition of the Susquehanna will depend on how future growth and land development occurs. Dramatic changes have occurred since white settlers entered the region 250 years ago and further transformations of the land still lie ahead. State and local governments will need to plan for these changes. Yet even as they do, there's still a lot you can do to help clean up the Susquehanna.

## **WHAT YOU CAN DO**

If you're a homeowner, there are many things you can do around your property to prevent runoff.

- Use bricks, flagstones, and interlocking paving stones for walks and driveways instead of impervious materials such as concrete or asphalt.
- Fertilize sparingly and according to manufacturer's instructions .
- Plant trees and grass along stream banks to establish buffer zones.
- Frequently inspect and periodically pump out septic tanks (every three to five years) and routinely check for system failures.
- Use phosphate-free detergents.

Farmers can learn more about Best Management Practices and available financial assistance from county conservation district offices and the Department of Environmental Resources.

Make your voice heard! Support land use plans that allow for controlled growth and that protect groundwater and wetlands. Working together, Pennsylvanians will in the future be able to call the Susquehanna (as Robert Louis Stevenson did in 1879) a shining river in a desirable valley.