Contaminants

There are two broad categories of contaminants: nutrients and chemicals. Nutrients include nitrogen, phosphorous, and pathogens. Chemicals are divided into classes, which include petroleum, solvents, organics, pesticides and herbicides, PCBs, heavy metals, and other inorganics. Contaminants may enter the environment from a variety of sources, such as large industries, small businesses, mobile sources, agricultural operations, residential areas, and biological sources, as well as from the air outside the Basin. Because the Chesapeake Basin in Delaware is the headwaters of the Basin, contamination from water outside the Basin is not an issue, with the exception of tidal waterways, such as the Chesapeake and Delaware Canal and the Nanticoke River.

Nutrients

Nutrient enrichment of water is a natural process, spanning thousands of years, and resulting from natural erosion and the breakdown of organic material. However, soil erosion, domestic waste disposal, and runoff can greatly increase the rate and amount of nutrients reaching waterways. Too many nutrients in the water can create a situation called *eutrophication*. Eutrophication is defined as an excess of nutrients (namely nitrogen and phosphorous) in the water, which causes accelerated growth of algae and plankton, depletion of dissolved oxygen, increased turbidity, and a general degradation of water quality. Dissolved oxygen is vital for fish and other aquatic life. Eutrophication is one of the most serious problems facing the Chesapeake Bay today. Agricultural runoff, urban runoff, and municipal and industrial point source discharges are the primary sources of nutrients.

Agriculture is Delaware's number one industry, with poultry the primary agricultural product. Sussex County is the number one broiler-producing county in the nation. Within Sussex County, the Indian River, Nanticoke River, and Broad Creek watersheds are meccas of poultry production. The Broad Creek watershed has the greatest density of poultry per acre than any other watershed in the State. Consequently, the Nanticoke River and Broad Creek have a surplus of manure. Both waterways are rated high in susceptibility to *non-point source* water pollution.

Manure can be a valuable agricultural by-product if managed properly. However, applying manure in excess or at the wrong time to agricultural fields may release nutrients into the air or water. Instead of nourishing crops, the nutrients become pollutants. The major concern is that excess nitrogen can leach through the soil and into the ground-water. Waste management and alternative uses for poultry litter need to grow with the industry. A good example of this is the Perdue AgriRecycle plant which went into operation in 2001. This plant converts chicken manure into pellets which are used as fertilizer in other parts of the country. Over 15,000 tons of manure is processed each year and moved off of the Delmarva peninsula. The Delaware Nutrient Management Commission, through their Nutrient Relocation Program, provides assistance to transport excess poultry litter, to areas that can utilize the additional nutrients throughout Delaware, Maryland, New Jersey and Pennsylvania. Since 2001, the program has relocated over 200,928 tons of manure (figure includes 44,000 tons exported by Perdue's AgriRecycle pellet-fertilizer plant).

Chemicals must be properly stored to ensure that they are not released into the environement.

The Chesapeake Basin has one of the highest percentages (95 percent) of land area served by *septic systems* as compared to other areas in the state. Many of the parcels are strip developments along rural roadways. Due to moderate to poorly-drained soil conditions, there are limitations for on-site septic disposal. Research in the Nanticoke watershed indicates that a notable amount of nitrogen loading may be originating from septic systems. As the soil types and water-table depths in the Nanticoke watershed are similar to the rest of the Chesapeake Basin, similar nutrient loads can be expected throughout the Basin.

Pathogens are disease-causing bacteria and viruses. There are many sources of pathogens. Sources of greatest concern are raw or inadequately treated sewage. The potential daily pathogen output from one person's untreated sewage can equal that of treated sewage from hundreds to possibly thousands of people, depending on the level of treatment. Wildlife and animal operations can also be significant sources of pathogens. High levels of bacteria pose a serious risk of illness to shellfish consumers, swimmers, and others who come in contact with contaminated waters.

Twice a month, numerous sites within the Chesapeake Basin are tested for bacteria. Delaware uses a standard of 70 total coliform bacteria per 100 ml; and fewer than 10 percent of the samples don't exceed 330 total coliform per 100 ml. All data from four stations in the Nanticoke Watershed are in excess of the 70 total coliform/100 ml shellfish harvest standard. Wading sample data collected from one station in the Trap Pond swimming area have led to the closing of Trap Pond for swimming over the last several years.

Chemicals

Chemical contamination from industrial sources and the potential threat of this contamination is not widespread in the Chesapeake Basin. The highest concentration of these sites occurs within, and immediately surrounding, the towns located in Sussex County. Leaking underground storage tanks make up a majority of the sites with known contamination. Petroleum hydrocarbons are the chemical contaminants most often found at these sites, which can cause contamination of nearby drinking wells.

A large number of chemical contaminants are present in the Chesapeake Basin. Chemical releases in the Chesapeake Basin have been documented at landfills, some *hazardous waste* generators, Superfund sites, underground storage tank sites, and salvage yards. All of these sites are under various stages of investigation and remediation.

Excess poultry litter to be relocated to areas that are in need of additional nutrients for crop production.