

When the Federal *Clean Air Act* and *Clean Water Act* became laws in the early 1970s, air pollution and water pollution were considered two separate problems. In recent years, research has provided us with a better understanding of the link between these environmental threats. There is strong evidence that cleaning up the air will also lead to cleaner water. Since 1993, the Chesapeake Bay Program has evaluated the effectiveness of air pollution controls as a part of the overall effort to protect the Bay from its number one pollution problem: an overabundance of the nutrients nitrogen and phosphorus. The following is an overview of the latest scientific findings related to nitrogen emissions and deposition in the Chesapeake Bay region.

### New Info on Airshed Emerges

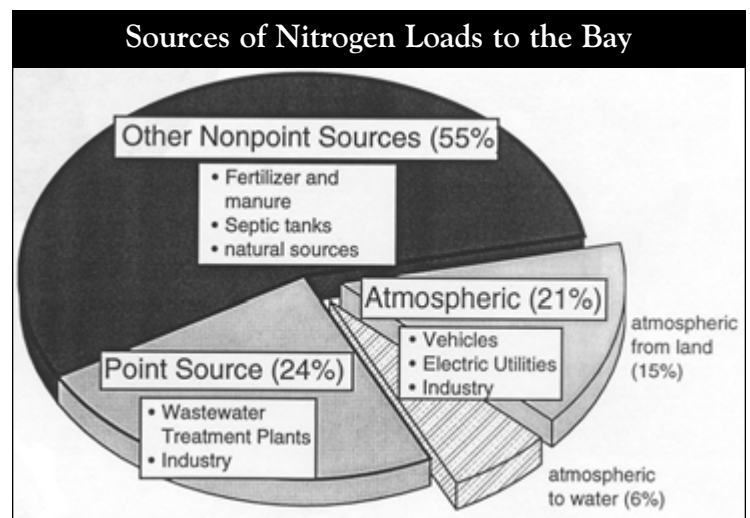
The Bay Program is regularly updating air-related data and information to help managers better assess and target pollution control measures. To assist in this effort in 1999, experts reevaluated the nitrogen oxide, or NO<sub>x</sub>, airshed for the Chesapeake Bay region. The reevaluation concluded that the airshed is 418,000 square miles, or roughly 15% larger than previously estimated. Gauging the size of the airshed is important for Bay managers because air pollution has local and long-range impacts. Depending on the source and chemical make-up, air pollution can be carried by the wind for hundreds of miles before depositing on the earth. Almost everything that burns emits NO<sub>x</sub>. Some of the primary sources include industries, electric utilities, and automobiles. These sources, and others, contribute to the nitrogen-rich air pollution that affects the Bay and its rivers.

### Interest in Ammonia Emissions on the Rise

Ammonia is another form of nitrogen emitted into the air by natural and man-made sources. The primary sources of ammonia emissions include agricultural activities and urban influences. More than 90% of the ammonia emissions in the Bay region are generated by agricultural activities, including confined and unconfined animal operations and fertilizers. Urban influences include wastewater treatment facilities and fossil fuel combustion from engines. Experts agree that the impact of ammonia emissions in the Bay region are an important emerging issue that will receive further study in 2000. Computer modeling experts plan to have an estimated ammonia airshed for the Chesapeake Bay region and the results from several ammonia research studies ready by the fall. Gauging the size of this airshed is important for Bay managers because ammonia emissions—like NO<sub>x</sub> emissions—also have local and long-range impacts.

### How Much Nutrient Pollution Comes From Air?

When scientists and other experts measure the amount of atmospheric nitrogen that reaches the Bay, they evaluate two aspects: deposition and loading. Deposition is the process by which air pollutants deposit to the Earth's surface. Loading is the amount of pollution that is delivered directly to the Bay and tributaries. When nitrogen-rich air pollution lands directly on the water, the deposition amount equals the loading amount. But, when air pollution is deposited on land, the nitrogen can be used up as it is carried by surface runoff or through groundwater flow before it reaches the waters of the Bay. For example, in a forested ecosystem, experts believe that roughly 90% of the airborne nitrogen deposited is absorbed by the vegetation. This means that for every ten pounds of nitrogen deposited, one pound will become a loading to the Bay. The difference between deposition and loading makes characterizing the contribution of atmospheric nitrogen pollution a challenge. However, experts agree that the amount of nitrogen pollution from the air is significant. In fact, about one quarter of the total nitrogen delivered to the Bay comes from the air. Up-to-date information on loading and deposition is key for Bay Program managers because, as other nutrient source controls reach their limit of technology, controlling air-deposited nitrogen will become even more important to restore and protect the Bay.



Source: Chesapeake Bay Program Phase IV Watershed Model, 1985 Reference Scenario.

