

# Clean Air Act has led to improved water quality in the Chesapeake Bay watershed

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A new study shows that the reduction of pollution emissions from power plants in the mid-Atlantic is making an impact on the quality of the water that ends up in the Chesapeake Bay. Credit: Amy Pelsinsky/University of Maryland Center for Environmental Science

A new study shows that the reduction of pollution emissions from power plants in the mid-Atlantic is making an impact on the quality of the water that ends up in the Chesapeake Bay. The study by scientists at the University of Maryland Center for Environmental Science confirms that as the amount of emissions of nitrogen oxide from coal-fired power

plants declined in response to the Clean Air Act, the amount of nitrogen pollution found in the waterways of forested areas in Pennsylvania, Maryland and Virginia fell as well.

"When we set out to reduce [nitrogen pollution](#) to the Chesapeake Bay, deposition of nitrogen resulting from air pollution on the watershed was considered uncontrollable," said Donald Boesch, president of the University of Maryland Center for Environmental Science. "This study shows that improvements in air quality provided benefits to water quality that we were not counting on."

Researchers evaluated long-term water quality trends for nine forested mountain watersheds located along the spine of the Appalachian Mountains from Pennsylvania to southern Virginia over a 23-year period (1986 to 2009). The sampling began slightly before the Clean Air Act of 1990 imposed controls on power plant emissions to reduce nitrogen oxide pollution through its Acid Rain Program. According to the EPA, total human-caused [nitrogen oxide emissions](#) declined 32% from 1997 to 2005 in 20 eastern U.S. states that participated in the program.

Intended to reduce the emissions (sulfur dioxide and nitrogen oxide) that caused acid rain, the program had the unintended consequence of reducing the amount of nitrogen oxide particles landing on forests in the sample area and ultimately improving water quality in the watershed.

"It worked for something nobody anticipated," said lead author Keith Eshleman, a professor at the University of Maryland Center for Environmental Science's Appalachian Laboratory. "The original idea was to reduce nitrogen oxide concentrations in the atmosphere because that would reduce acidity of precipitation and decrease ozone in the atmosphere. The other result was that water quality has improved, a side benefit that was unanticipated."

Air pollution that falls on the land (known atmospheric deposition) is one of the biggest sources of pollution to the forested area that impacts the Chesapeake Bay—sixty percent of the watershed. Nitrogen accumulation has significant consequences for air quality, human health, and the health of aquatic ecosystems. When excess nitrogen enters the streams and waterways, it can cause algae blooms that significantly impact water quality and marine life.

"In our most pristine and most heavily forested basins, nitrogen deposition is a primary driver of pollution," said Eshleman. "Where we are located in the Mid Atlantic, we've historically had some of the highest rates of deposition, and received some of the greatest reductions owing to the Clean Air Act."

**More information:** "Surface water quality is improving due to declining atmosphere N deposition" is published in the November 5, 2013, issue of *Environment Science and Technology*.

Provided by University of Maryland Center for Environmental Science

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