



Relations of common solutions and acid-neutralizing capacity to the pH scale.

Acid Rain . . . The Invisible Threat

Visitors to Shenandoah National Park enjoy the animal and plant life and the scenery but may not realize how vulnerable these features are to various threats, such as invasion of exotic plants and insects, improper use of park resources by people, and air and water pollution. The National Park Service strives to protect natural resources from such threats to ensure that they will be available for enjoyment now and in the future. Because the National Park Service has limited influence over the air pollution that envelops the region, acidic deposition – commonly known as acid rain – is one of the more challenging threats facing park managers.

With the help of the U.S. Geological Survey (USGS) scientists, park managers are gaining a better understanding of how acid rain interacts with ground- and surface-water resources. Such insight also provides essential insight into ecosystem processes, as managers strive to unravel and resolve other environmental problems that are interrelated to acid rain.

YOU CAN HELP! Visitors can help reduce air pollution by using energy-efficient lighting and appliances, by adjusting behaviors related to household and workspace heating and cooling, and by car pooling or using mass transit systems.

Acid Rain Facts

- Acid rain is caused by combustion of fossil fuels (gas, oil, coal) and to a much lesser extent by natural processes (volcanic emissions, forest fires).
- Combustion emits sulfur dioxide and nitrogen oxides (the two major contributors to acid rain) into the atmosphere; these oxides can travel hundreds of miles from the source of the emission.
- Sulphur dioxide and nitrogen oxides convert to sulfuric and nitric acids in the atmosphere; the acids are deposited to the earth by wet deposition (rain, snow, fog) and dry deposition (dry particles, gases), collectively referred to as "acidic deposition."
- Some of the largest emissions in the United States originate in the Ohio River Valley and are carried downwind through the atmosphere toward Shenandoah National Park.
- The Clean Air Act, designed to reduce emissions, was passed in 1970, amended in 1990, and amended again in 1995.
- In Shenandoah National Park, the annual average pH values of precipitation for the following periods were: 4.53 for 1981–1990; 4.59 for 1991–1995; 4.62 for 1996–2005. These pH values suggest incremental improvements in response to the Clean Air Act amendments.
- Rain tends to be the most acidic during the summer; longer periods between storms allow acids to build up in the atmosphere before being "rained out."
- Individual pH values of rain well below 4.0 have been measured in Shenandoah National Park.