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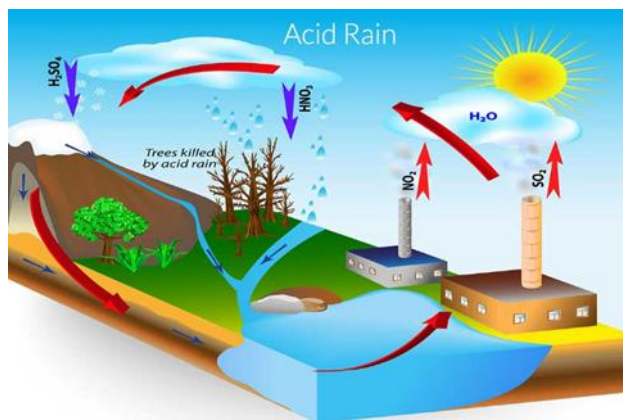
Acid Rain (Deposition) *Impacting New Hampshire's Ecosystems*

What you should know:

Acid rain is more correctly referred to as **acid deposition** because in addition to rain, acid can deposit as snow, sleet, hail, particles, gasses and water vapor. Acid deposition is a complicated atmospheric process that has many direct and indirect environmental and public health impacts. The process begins when certain pollutants are released into the air. Once airborne, these gases react with other atmospheric constituents to form various secondary compounds, including acids. The compounds are then carried through the atmosphere, sometimes over great distances, and are deposited to the earth in a wet form when there is rain, snow, or fog. These same gases and particles can also be deposited by simply settling out of the air (known as dry deposition). Because of acid deposition has affected water bodies in New Hampshire and surrounding states, about 80% of the state's lakes (and 90% of the remote, mostly high-elevation, ponds) are classified by the New Hampshire Department of Environmental Services (NHDES) as highly acid sensitive or worse.

How does acid deposition occur?

Nitrogen oxides (NO_x) and sulfur dioxide (SO₂) gas emissions from manmade and natural sources react in the atmosphere to form nitric (HNO₃) and sulfuric (H₂SO₄) acids. Winds can carry these pollutants hundreds of miles from the emissions sources. Acid deposition is greatest in during the summer months and in locations with more precipitation (such as in the mountains).



SO₂ emissions are mainly produced by the burning fossil fuels (coal and oil) at power plants, with some emissions from natural sources such as volcanoes. NO_x emissions come from power plants, other combustion sources (boilers and furnaces), and cars, trucks and buses. Prevailing wind flow from west to east means New Hampshire, New England, and much of eastern Canada are recipients of sulfuric acid, nitric acid, sulfates, and nitrates that originated as SO₂ and NO_x emissions from upwind urban and industrialized areas in the Northeast and Midwest.

What are the environmental and health effects of acid deposition?

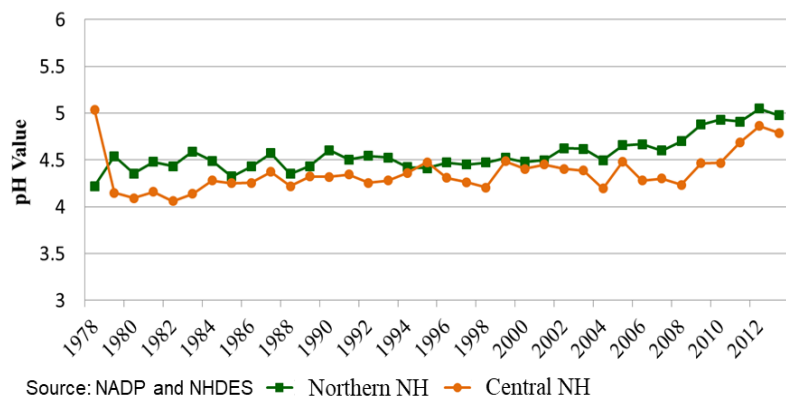
The impacts of acid deposition are varied and often interrelated, creating complex and far-reaching consequences to aquatic and terrestrial ecosystems, visibility and public health. Acid deposition can

increase the acidity of lakes and streams by either passing through soils or falling directly on water bodies. Changes in the acidity of lakes and streams can affect the survival of fish, amphibian and plant populations by impairing their ability to reproduce, grow, and ultimately survive.

- Terrestrial ecosystems can also be altered by the increasing acidity of precipitation and heavy metal deposition. Acids strip forest soils of essential nutrients needed to sustain plant life. This process threatens the reproduction and survival of trees and other forest vegetation.
- Deposition of acidic particles is known to contribute to the corrosion of metals and to the deterioration of stonework on buildings, statues, and other structures of cultural significance, resulting in depreciation of the objects' value to society. It can also damage paint on buildings and cars.
- The same gases that cause acid deposition are responsible for the formation of small particles in the air that can adversely affect human health and greatly reduce visibility. Sulfate and nitrate particles in the atmosphere produced from SO₂ and NO_x emissions account for more than 50% of the visibility reduction in the eastern United States and heavily influence concentrations of small particles or PM_{2.5}. These particles are small enough to be inhaled deeply into lung tissue, aggravating the respiratory and cardiopulmonary systems, especially in sensitive populations (people with asthma, emphysema, or other respiratory illnesses).

Is acid deposition still a problem?

New Hampshire has experienced high rates of acid deposition for decades and it will take decades before it can fully recover. Fortunately, we are making progress thanks to significant reductions of SO₂ and NO_x emissions in the United States and Canada. The acidity of precipitation in New Hampshire has decreased significantly, but there is still a lot of room for improvement. Pure water has an acidic pH measure of 7.0. Lower values are acidic. Current pH measurements are approaching a value of 5, representing progress from about 4 measured in 1979. Since the pH scale is logarithmic, a pH of 4 is ten times more acidic than a pH of 5. But a pH of 5 is still 100 times more acidic than a pH of 7. As acid deposition declines, lakes and streams undergo a slow recovery process based on wear and tear of rocks and soils to expose new sources of acid neutralizing compounds for protection.



What can you do to help reduce acid deposition?

There are many things you can do to help reduce the emissions that cause acid rain and to protect New Hampshire's environment from the adverse effects of acid deposition. Here are just a few:

- Conserve energy – turn off lights, computers, and electric appliances when not in use.
- Purchase and use energy efficient appliances and motor vehicles.
- Limit driving – ride a bike, car pool, and combine errands for fewer trips.
- Keep your car tuned-up and properly maintained – keep tires properly inflated.

For more information about acid deposition, contact NHDES Air Resources Division at **(603)-271-1370**.