

Brief Note on Effects of Acid Rain

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DESCRIPTION

The effects of acidification have been sighted all over the world, such as deleterious ecological effects which reduced reproduction of aquatic fish species, and stunted growth in plants, accumulation of toxic aluminum and heavy metals in soil and water bodies, biodiversity loss including corals and shellfish, degradation of manmade structures made up of marble and stone, and corrosion of metal structures. According to the 2012 progress report of the US EPA (2013), the impacts of major global environmental problems such as acid rain, acid deposition, depletion of the ozone layer and health and environmental effects of particle matter are declining. The report further added that though there is a significant reduction in SO₂, NO_x emissions and acid deposition have occurred via the active implementation of the Clean Air Interstate Rule (CAIR), Acid Rain Program (ARP), and NO_x Budget Trading Program (NBTP), the current emission levels are not sufficient to attain full recovery of acid-sensitive ecosystems. However, national composite means of average SO₂ annual mean ambient concentration have declined by 85% in the period between 1980 and 2012.

HISTORY OF ACID RAIN

The first observations of acid rain were recorded in Europe in the mid-19th century. In 1872, British scientist Robert Angus Smith introduced the term "acid rain" when he discovered that acid rain damages leaves. The first attempt to reduce acid rain was made in 1936 at the Battersea plant in London, England, but since 1970 the problem has been exacerbated. Ten years after the ongoing National Acid Rain Assessment Program (NAPAP), Congress passed the Acid Rain Act in 1980, as increased use of coal fuel raised levels of SO₂ in the atmosphere. This has expanded the network of dry sediment monitoring sites and the impact of acid rain on monuments, freshwater, terrestrial ecosystems, and buildings. Funded research was conducted on atmospheric processes and possible control programs. According to NAPAP's first acid rain assessment report in 1991, about 5% of New England (USA) lakes are acidic, with problems such as

changes in soil, freshwater biochemical patterns, and damage to man-made structures. Observed until 1990, the US Congress passed a change to the Clean Air Act. The amendment consists of SO₂ and NO_x controls.

This was done in two stages with the aim of reducing total SO₂ emissions by 10 million tonnes. Phase I (since 1995) limited SO₂ emissions from 110 of the largest power plants. Phase II (since 2000) affects most other power plants in the United States. Between 2000 and 2006, SO₂ emissions decreased by 54% (from 211,000 tonnes to 96,500 tonnes). Similarly, since 1999, several programmes have been implemented to reduce NO_x from factories and automobiles. By March 2005, the United States Environmental Protection Agency (USEPA) had issued the Clean Air Interstate Rule (CAIR). This reduces pollution from power plant emissions from one state to another.

EFFECTS OF ACID RAIN

Surface waters

Acid rain can also change the composition of soils and bodies of water, making it impossible for native flora and fauna to inhabit. For example, a healthy lake has a pH above 6.5. Acid rain increases acidity, so fish tend to die. Most fish species cannot tolerate a pH of water below 5. The ecological effects of acid rain are most pronounced in aquatic environments such as streams, lakes and swamps and can harm fish and other wildlife. As acidic rainwater flows through the soil, it can leach aluminum from soil clay particles and flow into streams and lakes.

Forest

Acid rain can be extremely harmful to forests. When acid rain penetrates the soil, it can dissolve nutrients such as magnesium and calcium that trees need to stay healthy. Acid rain also releases aluminum into the soil, making it difficult for trees to absorb water. Acid rain removes aluminum from the soil. Acid rain also removes the minerals and nutrients needed for trees to grow from the soil. In the highlands, acidic fog and clouds remove nutrients from the leaves, leaving brown or dead leaves.

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Acid rain on human health

Acid rain cannot directly harm humans, but the sulphur dioxide which produces that can cause health problems. In particular, sulphur dioxide particles in the air can promote chronic lung problems such as asthma and bronchitis.

Acid rain on buildings and monuments

Acid rain can damage buildings, historic buildings, and statues, especially those made of rocks such as limestone and marble that

are high in calcium carbonate. The acid in the rain reacts with the calcium compounds in the stone to form gypsum, which peels off.

How to reduce acid rain?

A good way to reduce acid rain is to generate energy without the use of fossil fuels. Instead, people can use renewable energy sources such as solar. Renewable energy sources help to reduce acid rain by significantly reducing pollution.