

Improvements in visibility

In the 1960's and 70's it became clear that smog was harming human health and acid rain was degrading forest and water bodies, and in extreme cases, contributed to the die off of trees and fish. In addition, smog and acid rain contains tiny particles that interact with the sunlight reducing the colors, textures and forms of what we see. On high pollution days, the haze reduced visibility to such a degree that people could not see across town and iconic symbols like the Washington monument in DC, the San Gabriel Mountains bordering Los Angeles and the Grand Canyon national park disappeared in the haze.

In these years the primary cause of the poor air quality was the burning of fossil fuels by coal-burning power plants, factories, and automobiles. When fossil fuels are burned sulfur dioxide (SO₂), and nitrogen oxides (NO_x) are released into the atmosphere. These gases react with water, oxygen, and other substances in the air to form the small particles that cause the haze. Winds can carry and spread these small particles hundreds of miles creating air quality issues over multiple states.

The only way to reduce haze, acid rain and smog is by curbing the release of the pollutants that cause it. This can be done by burning fewer or cleaner fossil fuels or removing the pollutants from the waste stream. To a lesser extent, emissions can be reduced by their removal from other industrial sources such as metal smelters.

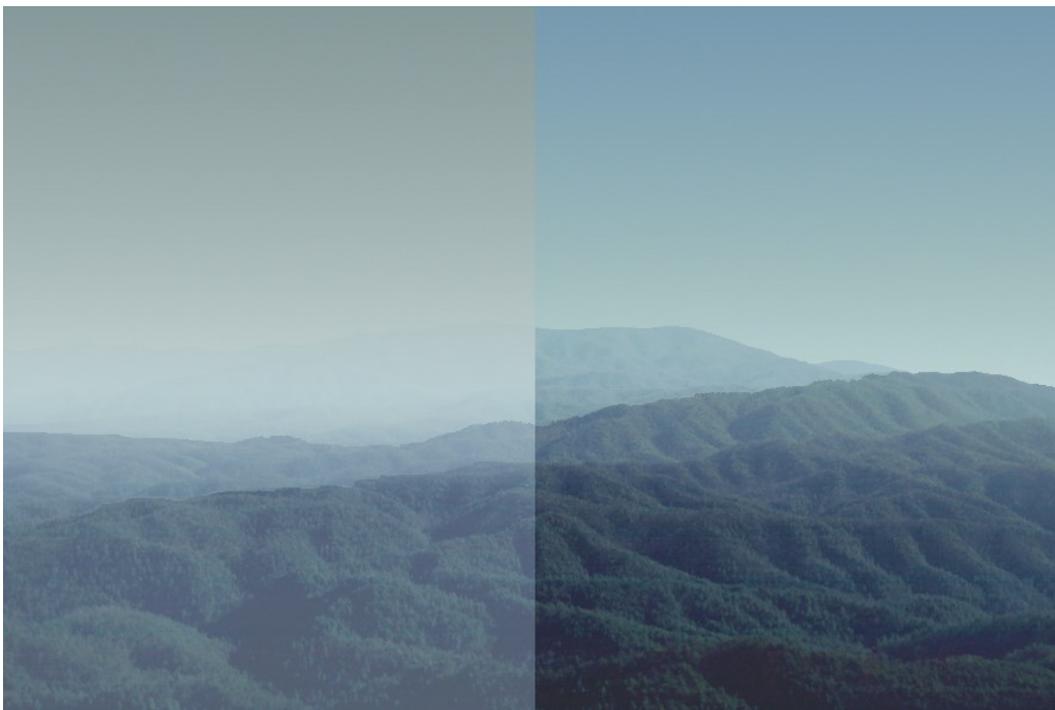
To that end, the 1970 Clean Air Act was passed that established a framework to reduce air pollutants to levels considered safe for humans and welfare. In 1977 the Clean Air Act was amended strengthening the ability to reduce emissions and defined certain scenic areas including many national parks as having scenic value worth protecting. National goals were defined to prevent future impairment and remedy existing impairment in these class I areas resulting from human caused pollution. In 1990 Congress created the Acid Rain Program in Title IV in additional Clean Air Act Amendments. The overall goal of the program was to achieve significant environmental and public health benefits through reductions in emissions from coal fired power plants and mobile sources, such as cars and trucks.

These regulations have been very successful in reducing United States emissions. For example, SO₂ emissions fell from nearly 31 million tons in 1970 to 8 million tons in 2010, a nearly four-fold decrease and NO_x emissions have dropped from nearly 27 thousand tons in 1970 to 13 thousand tons in 2010 (based on data from the Environmental Protection Agency). The progress is due mainly to the reductions from power plant that accounted for two-thirds or more of the total SO₂ emissions.

These reductions are all the more impressive when one considers that over this 40 year time period the U.S. population has grown 50%; electricity production has grown by 150% and the GDP has tripled in real dollars. In addition, economists have shown that actual costs of the emission reductions generally cost less than either industry or EPA's initial projections. The resulting public benefits of the emission reductions have returned 3 to 20 times the investments in the regulations (based on data from the White House Office of Management and Budget).

These decreases in emissions have led to significant reductions in smog, acid rain and haze. This can be seen by comparing the simulated visibility measured in national parks and other remote area, from the early 1990s and 2010. At places such as Great Smoky Mountains National Park, TN, Acadia National Park, ME and San Gorgonio wilderness, CA a considerable improvement is observed in visibility over this twenty year period. Simulated images such as these provide a tangible way to observe the success of the regulations of emissions that have resulted in cleaner, clearer air.

Since the passage of the Clean Air Act in 1970, the United States has come a long way in improving its air quality resulting in cleaner and safer air for people, ecosystems and visual enjoyment. However, air quality issues still remain and diligence is required to maintain the good air quality we now enjoy and resolve these remaining problems.



Simulated visibility at Great Smoky Mountains National Park. Left side: 1990; Right side: 2010.



Simulated visibility at Acadia National Park. Left side: 1990; Right side: 2010.