

# Air Quality Issues

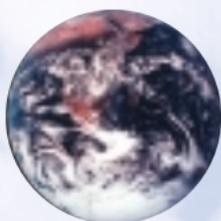


# Key Issues

The mission of the Northeast Regional Air Quality Committee is to protect and improve air quality, and increase public awareness of air quality and air pollution impacts in the protected areas of the Northeast United States and Atlantic Canada. Air pollution is a serious threat to the health and viability of ecosystems and can reduce full public enjoyment of our wildland resources.

Seven key stressors that have an impact on the Northeast United States and Atlantic Canada are:

- **Acidification**  
*(caused by acid rain)*
- **Climate Change**  
*(greenhouse gases)*
- **Ground Level Ozone**
- **Mercury**
- **Nitrogen Deposition**
- **Particulate Matter**
- **Stratospheric Ozone Depletion and UV Radiation**



## Ground Level Ozone

Ground level ozone is the primary component of smog. In the presence of strong sunlight, various pollutants combine to form ground level ozone, a process which can happen even in rural areas



ACADIA NATIONAL PARK

Ozone damage on Quaking Aspen in a research plot.

well downwind from pollution sources. Sources of these pollutants include power plants, industry and vehicle emissions. Ground level ozone, particularly in higher concentrations is harmful to humans, affecting the respiratory system. Ozone also affects vegetation, causing leaf injury and, in some cases reduced growth and reproduction. Ozone injury has been documented in a number of sensitive species, including quaking aspen, wild grape, black cherry and white pine.

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## Particulate Matter and Visibility

Air pollution can reduce visibility by affecting the color, clarity, and contrast of far away objects. Visibility impairment is caused by the mixture of solid particles, gaseous compounds, and liquid droplets found in the air. Solid particles and liquid droplets are referred to as particulate matter (PM). These particles come in a wide range of sizes and originate from human activities and natural sources. Fine particles (PM<sub>2.5</sub>) are less than 2.5

microns in diameter and are emitted from power plants, industry, motor vehicles, and residential fireplaces. These fine particles, in addition to causing human health effects, make up “haze”, and can be carried long distances, sometimes hundreds of kilometers from their source. The majority of visibility impairment in the eastern U.S. and Canada is due to sulfates derived from human activities in the burning of fossil fuels.



ACADIA NATIONAL PARK

Good and bad visibility at Acadia National Park caused by regional haze.



## Acidification

Sulfur and nitrogen oxides from power plants, industry, cars and other sources cause rain, snow, and fog to become acidic. Certain lakes, streams, and soils are particularly sensitive to this



The Common Loon can be adversely affected by atmospheric deposition such as acid rain and mercury affecting reproduction and behaviour.

acidic deposition. Some lakes and streams in the Northeast U.S. and eastern Canada have become so acidic that they can no longer support fish and sensitive invertebrates. In Nova Scotia for example over half the salmon rivers that flow through the Southern Uplands produce no or few salmon. Pollution emission controls have resulted in improvements in some cases but not everywhere. Further emission reductions are required to protect sensitive lakes and streams. Forests are also suscep-



Atlantic Salmon have been severely affected by atmospheric deposition, contributing to extinction in many rivers in the region.

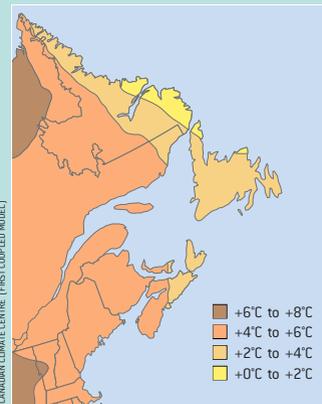
tible to acid deposition. For example, spruce trees in high-elevation areas of New York, Vermont, and New Hampshire have declined because of exposure to acidic clouds and

acid deposition. Similarly leaf browning and deterioration of white birches adjacent to the Bay of Fundy have been linked to acid fog deposition. Other forests are experiencing a gradual loss of plant nutrients, such as calcium and magnesium, because of leaching of the soil caused by acid deposition. In many cases, this will reduce forest health over the long term. Critical loads for New England and the Maritimes are being exceeded and more emission controls are required.

## Climate Change

The greenhouse effect occurs naturally when greenhouse gases in the atmosphere, such as carbon dioxide and methane, absorb energy radiated by the earth and emit it back into the atmosphere as heat. Over the last century, human activities, primarily the burning of fossil fuels, have resulted in an unprecedented rise in the concentration of greenhouse gases. Over this same period the average global annual temperature has risen by 1°F or 0.6°C. The majority of scientists attribute this warming to emissions of greenhouse gases from human activities. A warmer earth will bring about

dramatic changes. As ocean waters warm and expand, and as land ice melts, sea levels will



Potential impacts of climate change in 2090.

rise increasing the risk of flooding in coastal areas. Weather patterns throughout the world may change, leading to greater frequency of extreme weather events, such as hurricanes, storm surges, and droughts. As climatic zones shift, the additional stress on habitat and wildlife is likely to lead to a decrease in global bio-diversity. Over Northeast North America we can expect changes in vegetation patterns and wildlife ranges, such as the spread of southern species northward, the reduction of residual arctic and alpine ecosystems, and possibly more forest fires. To slow the rate of climate

change, emissions of greenhouse gases from human activities will need to be reduced. Most of these emissions are the result of burning fossil fuels for transportation, electricity, heating and cooling. Reduction is the shared responsibility of governments, industry and each individual. Using less fossil fuels has the added benefit of reducing the amount of smog and acid rain as well as particulate matter, mercury and nitrogen pollution. The simultaneous benefits to climate, ecosystems and human health make reduction of fossil fuel use a priority.

## Nitrogen Impacts on Coastal Ecosystems

Many estuaries and bays in the Northeast U.S. and Atlantic Canada are being affected by excess inputs of nitrogen, whether from the atmosphere or runoff. Principle sources of nitrogen are from fertilizers sewage, wastewater and transportation.

Nitrogen is a nutrient that stimulates growth of algae, which in turn can cloud water, and block sunlight, inhibiting growth of seagrasses that provide habitat for fish and shellfish. When algae die they decompose, removing oxygen from bottom

waters and causing declines in populations of crabs, oysters, mussels, and clams. Studies are ongoing in the Gulf of Maine, Massachusetts Bay, and other areas to evaluate effects of nitrogen on these systems.



A future vision, stream restoration as a result of major reductions in nitrogen run-off and atmospheric deposition.

# Mercury

Mercury is released into the atmosphere from natural and human sources, including power plants, industry, and incinerators. Because of its volatility, mercury can be carried long distances in the air and deposited in remote



US FISH AND WILDLIFE SERVICE

River Otters can accumulate toxic levels of mercury.

areas. Mercury derived from human activities may result in enhanced mercury levels in humans and wildlife. Mercury damages the nervous system and can affect behavior, reproduction and development. Fish-eating wildlife, such as loons and river otters, can also accumulate toxic levels of mercury in their bodies, resulting in decreased reproduction and other toxic effects. Many areas, including the Northeast U.S. and Atlantic Provinces, have fish consumption advisories because of high mercury levels in tissues.

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# Stratospheric Ozone Depletion and UV Radiation

High in the sky in the stratosphere, ozone forms a protective layer that shields us from the sun's harmful ultraviolet (UV) rays. In 1985 the scientific community discovered a large "hole" in the ozone layer above Antarctica. In the 1990's similar thinning was found over the Arctic. The depletion of the ozone layer is caused by an accumulation of industrial chemicals in the stratosphere such as chlorofluorocarbons (CFCs) that react with and destroy ozone molecules. This has resulted in increases of ultraviolet radiation reaching the earth. Increased UV radiation may lead to more skin cancer, cat-

aracts, and immune system suppression in humans. It may also cause reduced growth in fishes, mollusks, and crustaceans; possible effects on benthic invertebrates and amphibians; and DNA damage and reduced photosynthesis in plants.



MICHAEL BURZYNSKI

Increased ultra-violet radiation and acid rain are believed to be two of the key factors that have caused decreases in amphibian populations.

# You Can Help

Share these important messages with a friend. Let people know you care. One of the driving forces behind reducing air pollution is your concern and involvement. Take action on our suggestions below and learn more about efforts to reduce air pollution in your area.

Reduce energy consumption at home and at the office. Conserving electricity reduces air pollution caused by power plants.

- Use energy-efficient lighting and appliances.
- Make sure that lights and appliances are turned off when not in use
- Ask your local utility about its customer energy conservation program. If they have one, join up. If they do not, encourage them to start one.
- Buy fuel-efficient motorized equipment.
- Ensure your home is well insulated.
- Dispose of chloro-fluorocarbons and other toxic chemicals safely at approved recycling/ disposal sites.
- Use wood stoves and fireplaces wisely and sparingly.
- Use renewable sources of energy.

Automobiles are a major source of air pollution. If you drive a car, how you drive and care for it is important. Less driving, good maintenance and efficient driving habits all help solve the problem.

- Use alternative transportation when possible.
- Drive less – walk, bike, or take public transit.
- Combine several errands into one trip.
- Avoid driving during peak traffic periods when stop and go traffic is at its worst.
- Do not idle the engine unnecessarily.
- Get regular engine tune-ups and car maintenance checks.
- Do not remove or tamper with pollution control devices.
- Do not overfill or “top off” your car’s gas tank.
- Select a fuel-efficient vehicle when buying your next car or truck.
- Look for housing close to your work to minimize commuting.

## Northeast Regional Air Quality Committee

The Northeastern Regional Air Quality Committee (NERAQC) was established in 1995 in order to foster cooperation between the United States and Canada on air pollution issues in national parks, wildlife refuges and other protected areas in New England and Atlantic Canada.

The committee is made up of international, federal, state and provincial representatives. The Committee provides a means for information exchange on air pollution research, air monitoring and mitigation efforts that impact on parks and protected areas.

More information is available on the internet as follows:

<http://capita.wustl.edu/NEARdat/transflo/NERAQC/NERAQC.htm>