Isle Royale
National Park
National Park Service
U.S. Department of the Interior

Air Quality: The Vital Connection

Isle Royale's crisp, clean air is usually quickly noticed by visitors to the park. In this wilderness, isolated by miles of water at every point of the compass, we can feel totally removed from the urban areas where most of us live our daily lives. After all, Isle Royale is as close to being an isolated ecosystem as any national park in the United States. But one important resource--the air--connects Isle Royale to the mainland, to your home towns, to all fifty states, and even to other countries.

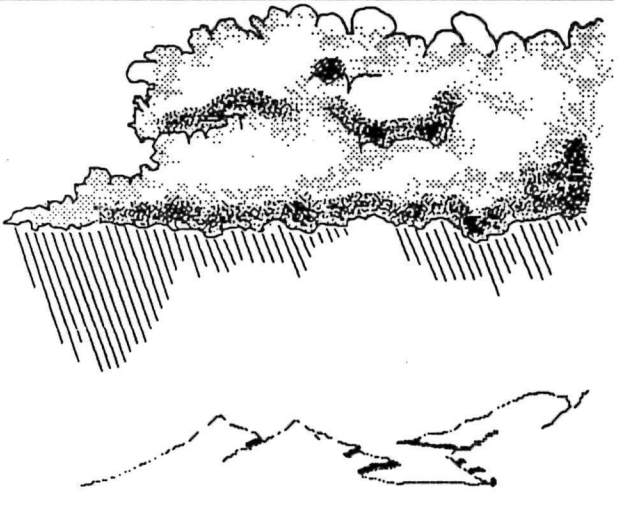
A Shared Resource

Scientific study of wind and weather has found that air is dynamic. Local weather patterns are affected by continental patterns, which are, in turn, linked to global changes in the earth's atmosphere. Our atmosphere is like a huge house filled with air that is kept constantly moving by a giant fan. But clean air is not unlimited: we can't just add on another room to the house in order to fill up with a new supply. That is why clean air at Isle Royale National Park is so precious and should not be taken for granted. It is a limited resource, one which is affected by industrial production, agricultural activity, and urban living many miles away.

The United States is gifted with an abundance of natural resources. We have millions of acres of land to grow food on, large reserves of fossil fuels for energy, wide tracts of forests that provide us with timber, and tons of minerals and metals which are turned into thousands of important products. Combined with modern industry and technology, these resources have enabled most of us to live comfortably. Other resources, such as clean water, clean air, and wilderness areas like Isle Royale, provide us with a high quality of living. Unfortunately, these important aspects of our lives are often in conflict with each other. People from all over the world fly or drive long distances to see the beautiful vistas located within or near our national parks. Ironically, once they arrive, the lovely view they came to see may be hidden by the brownish haze of air pollution. To protect and preserve clean air--a precious, shared resource--has become an important challenge to the National Park Service, the nation, and the world.

Clearing the Air

Recently, it has become apparent that some of our most popular national parks are experiencing serious air pollution problems. In 1985, the Park Service reported to Congress that "even in remote areas such as Grand Canyon National Park, visitors sometimes cannot see the opposite canyon rims or the canyon depths because of poor visibility." Air pollution is a complex problem. There are hundreds of air pollutants and many sources of pollution. The three major air quality concerns for our national parks are the reduction in visibility, damage to vegetation from gaseous pollutants (especially ozone and sulfur dioxide), and the effects of acid precipitation. In addition, a real concern at Isle Royale is the long-range transport of toxic chemicals that come to earth with the rain, polluting the park's lakes and streams and entering the food chain.



As a result, "Clearing the Air," a nationwide National Park Service air quality education program, was started in February 1987. It is intended to develop public understanding of air quality and related issues as they affect the natural and cultural resources of the parks. Isle Royale National Park is taking an active part in "clearing the air."

Trouble on the Horizon

Over 60 national parks are recording the effects of air pollution on the park visitor's view. This monitoring shows that, more than 90% of the time, scenic vistas are affected to some degree by human-made pollutants at all monitoring stations in the lower 48 states. Sulfur oxides, nitrogen oxides, and tiny particles create brown haze that reduces our ability to see long distances. At Great Smoky Mountains National Park (located in Tennessee and North Carolina), there has been a 30% decline in visibility over the past 35 years. The haze has become so bad that the park's major vistas are obscured one-fourth of the time. At Isle Royale (where basic air monitoring was begun in 1987), an automatic camera on Mt. Ojibway records the view once daily during the winter and three times a day during the visitor season. Scientific instruments have also been set up to measure levels of fine particles, sulfur dioxides, and ozone.

Ozone and Sulfur Dioxide

Ozone is also a concern for other reasons. It is created when heat and light from the sun react with some of the chemical by-products of the combustion of fossil fuels. When ozone is present at high levels, it impairs breathing in humans, especially the very young and the elderly. Even at lower levels, it causes damage to plants and animals. Of particular concern to the Park Service is its toxic effects on plants. Ozone enters through a tree's leaves and attacks the food-producing cells. As the tree weakens, it becomes susceptible to insect infestations and disease. Similar damage can occur from gaseous sulfur dioxide. Because of this, Isle Royale National Park measures levels of both ozone and sulfur dioxide using equipment on Mt. Ojibway.

Acid Skies

When fossil fuels (such as gas, coal, and oil) burn, sulfur dioxide and nitrogen oxides are given off. When these chemicals mix with water vapor in the air, they form weak acids and fall back to the earth in the form of acid precipitation. They travel long distances with weather systems and come to earth in the form of acid rain, snow, fog, or mist, or as acidic dry particles. Over time, acid precipitation can change the natural chemistry of lakes and streams so that life-forms start to die off and eventually disappear altogether. Acid in the park's rainfall has been recorded at levels 10 to 40 times higher than normal. But calcium-based minerals in Isle Royale's bedrock and soils seem to act as an antacid, neutralizing the effects of acid rain on lakes and streams.

Intensive study is also underway on two of the park's watersheds (a watershed is the area of land where water is stored in the soil before it drains into streams and lakes). We can tell what's coming into these watersheds by collecting precipitation samples, and what's coming out by sampling the water in the streams and lakes. By comparing the chemistries of the inputs and outputs, we hope to gain some important information about the effects of acid precipitation on life within these watersheds. So far there appears to be no immediate threat to Isle Royale from acid precipitation. But only time will tell.

The Toxic Threat

Besides the chemicals that cause acid precipitation, other air pollutants are known to travel very long distances on the wind. Over 800 toxic chemicals have been identified in the Great Lakes. Some of these substances have been found in lakes on Isle Royale and in the waters of Lake Superior surrounding the park. Toxaphene, a pesticide used only in the South and the Great Plains, is a good example. The only possible way it can get to Isle Royale is by a ride on the wind. Such chemicals build up in the food chain until relatively high levels are found in the larger sport fish which people love to eat. It is suspected that these chemicals are causing birth defects in Great Lakes bird populations and tumors on some fish. The exact effects on humans and wildlife are unknown, but anglers have been cautioned to limit their consumption of Great Lakes fish.

A Benchmark for the Future

The news about air pollution at Isle Royale, then, is good and bad. The bad news? Even on Isle Royale--a National Park and International Biosphere Reserve set aside because of its wilderness beauty and isolation--air pollution has surfaced in several forms. Some of the same kinds of air pollution you thought you left behind at home can also be found on Isle Royale. *The good news is that the levels* of air pollution in the park are low--so far. More study is needed, but the significance of Isle Royale's current air quality research is that it will one day serve as an important baseline or benchmark as our nation tries to decide how clean the air can and should be. That is Isle Royale's role in fulfilling our understanding of air quality--the vital connection.