

Research has commonly focused on adult game fish instead of more sensitive juveniles or organisms lower in the food chain. For this reason, *Science* magazine warns that "estimates of biological damage to aquatic communities by acid rain are unquestionably too low." The danger looks even worse than we had feared.

How a Lake Dies

Lake studies in northwestern Ontario are dramatic proof of acid damage. For eight years, scientists from Canada's Department of Fisheries and Oceans dosed a small wilderness lake with sulphuric acid, simulating the effects of acid rain. (See photos.)

- The fathead minnow and the tiny freshwater shrimp, important food for lake trout, were eliminated.
- The population of slimy sculpin declined sharply, and crayfish virtually disappeared.
- As acidification increased, emaciated and deformed fish were found.
- Toxic heavy metals were released from the lake bottom and became concentrated in the water.
- Finally, fish stopped reproducing and the trout population began to die out.

Why Our Lakes Are Vulnerable

The risk of damage to fisheries resources is particularly severe because of the geology of large areas of North America. The lack of rocks or soils with

a lime base to "buffer" the acid makes more than half of Canada susceptible. Much of northern Minnesota, Wisconsin and Michigan have soils which make their lakes sensitive to acid rain. Some 2,600 Wisconsin lakes are threatened, and half of the Boundary Waters Canoe Area lakes are susceptible to damage.

The Mounting Toll

Scientists believe that some 150,000 eastern Canadian lakes—one in every seven—have already suffered biological damage from acid rain. In fact, up to 70 percent of the lakes in eastern Canada may be affected.

In the northeastern United States, hundreds of lakes are nearly lifeless. More than 9,000 others may be damaged if acid rain continues at present rates.*

Hardest hit are lakes in New York's Adirondack Mountains. Nearly 11,000 acres of Adirondack waters have reached a critical state of acidification. Fish in more than 200 lakes have disappeared.*

Some 4,600 Florida lakes are sensitive to acid rain, and 2,600 of those qualify as extremely sensitive.* This is of real concern in the state, which has one of the *fastest growing emission levels* of acid-rain-causing pollutants in the nation.

Acid Rain Hurts The Economy

A multi-billion-dollar recreational and commercial fishery is at stake.

Marinas, tackle stores, tourist lodges, guiding or other services—hundreds if not thousands of businesses in Canada and the United States—will suffer if acid rain continues.

In Canada, sportfishing contributed (U.S.) \$4.5 billion to the Canadian economy in 1985. In Nova Scotia alone, anglers spent \$25 million.

The Sport Fishing Institute estimates that U.S. sport fishermen spend \$25 billion annually in pursuit of their pastime.

Economists studying the impact of acidified, fishless lakes estimate that 80,000 angling days a year have been lost in the Adirondack region alone.

How Can We Fight Acid Rain?

In the short term, we can treat the symptoms. In the same way that bicarbonate of soda neutralizes stomach acid, large amounts of slaked lime or other neutralizers can balance acid inputs to lakes and rivers.

But liming cannot bring back dead lakes—it won't restore food chains or replace dead fish. At best, it is an interim measure which may prevent bodies of water from becoming acidic, allowing us time to reduce acid emissions.

Over the past 15 years, sulphur-dioxide emissions in eastern North America have declined substantially. Lakes and rivers in areas where deposition has been reduced show signs of recovery. Without a guarantee of continued reductions, this downward trend could be reversed.

*Source: EPA National Lake Levels Survey.

Canada

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