How Many More Lakes Have to Die ?

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The Not So Gentle Rain

Nature has wrapped the earth in a thin layer of oxygen, nitrogen and a few rare gases.

All people, animals and plants live in that layer. The people and animals breathe in oxygen and breathe out carbon dioxide. The trees and other plants reverse the process.

This neatly balanced atmosphere is now being altered. Industrial smoke and automobile exhausts are injecting sulphur dioxide and nitrogen oxides (as well as a large number of other foreign substances) into the wind-swept air. They may travel hundreds or thousands of miles from their sources, be transformed chemically into acids, and come down to earth in the form of acid rain (or snow, sleet or even fog), as gases or as dry particles that can combine with the morning dew.

The effect on lakes in eastern Canada and the northeastern United States has been pronounced. In hundreds of them animal and plant life has been virtually destroyed—some 180 of the Adirondack region's 2,800 lakes are without fish, and 140 fishless lakes have been documented in the province of Ontario. Effects once found mostly in the east have now been reported over a much broader area. The evidence suggests that if acidity levels continue to rise, life in thousands of other lakes may disappear within a decade or two. In less obvious ways, the rain may also have deleterious effects on the health of people, forests and farms.

The problem is international and political—the pollutants often rise in one country and come down in another. Canada and the United States are making a joint effort to clean up the air of North America. They have in the past worked together on other issues with conspicuous success, but this time progress has been slow and time is running out.

Technology exists to greatly reduce the acid rain problem now, before much greater damage is done. To do so will require prompt action by both countries. In this issue of CANADA TODAY/D'AUJOURD'HUI we survey some of the damage done, consider that likely to come and suggest solutions.

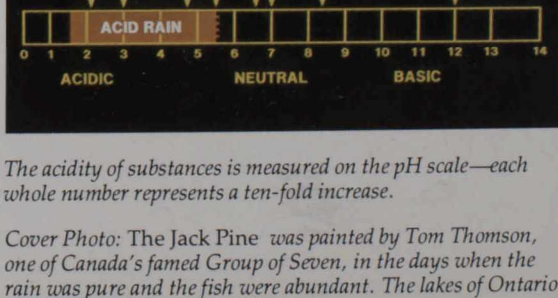
What We Know

Q: *What is acid rain?*

A: Acidity is measured by the pH scale of zero to fourteen. For example, a body of water with a pH reading of seven is neutral, those with higher readings are alkaline and those with lower ones acidic. Clean normal rain over continental areas is slightly acidic with pH readings of around 5.6. (The carbon dioxide naturally present in the air sometimes combines with moisture to form weak carbonic acid.) When the pH drops one point, the acidity rises tenfold. A pH of four is one hundred times more acidic than one of six. The rain that now falls in the Adirondacks averages levels around 4.2. The lowest recorded level for a single storm, a pH of 1.5, was measured recently in Wheeling, West Virginia. That rain was as acidic as lemon juice.

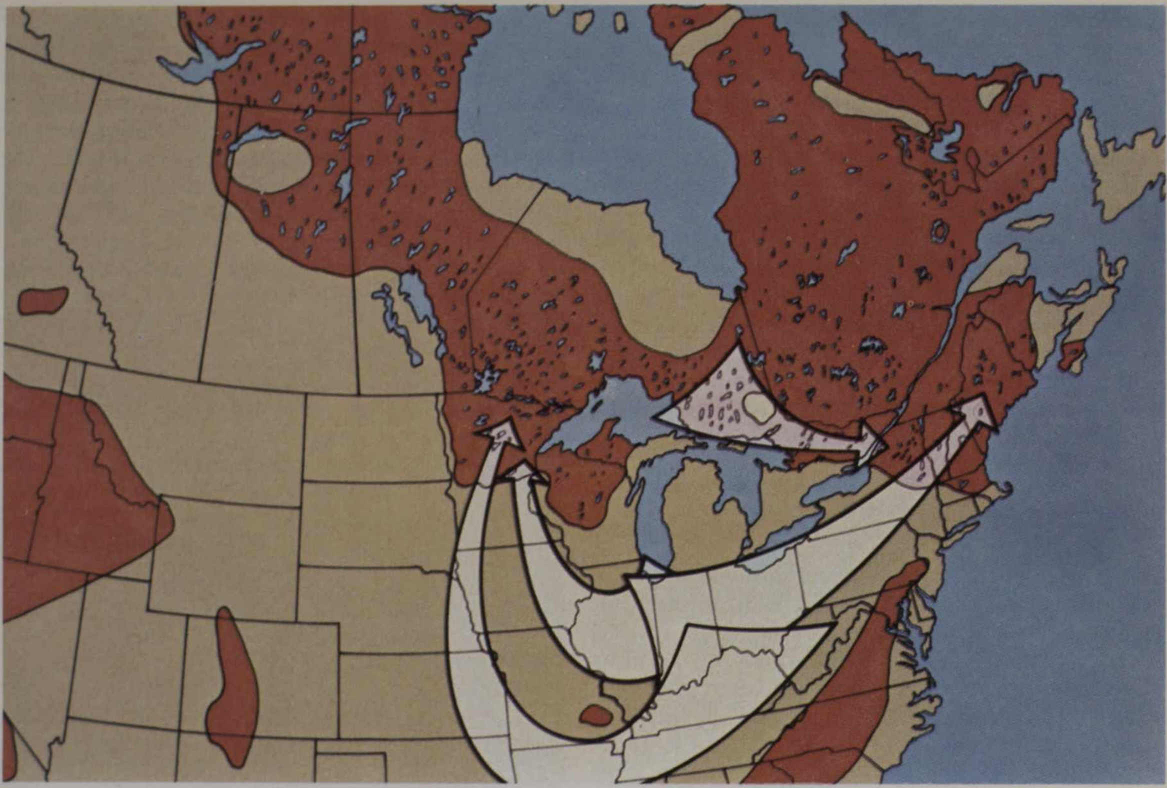
Q: *Where does acid rain come from?*

A: Acid rain occurs when sulphur dioxide and nitrogen oxides oxidize and then combine with cloud moisture to form mild solutions of sulphuric and nitric acids. The sulphur dioxide comes from the smokestacks of utility plants or smelters, the nitrogen oxides primarily from smokestacks and automobile and truck exhausts. Sulphur oxides are currently the main cause of acid rain. Utility and industrial plants in the United States produce about thirty million tons annually. Canada's smelters and plants contribute another five and one-half million tons.



The acidity of substances is measured on the pH scale—each whole number represents a ten-fold increase.

Cover Photo: The Jack Pine *was painted by Tom Thomson, one of Canada's famed Group of Seven, in the days when the rain was pure and the fish were abundant. The lakes of Ontario are still beautiful, but many are dead.*



The greatest concentration of sulphur dioxide emissions in North America is in the Ohio Valley, and the pollutants come down wherever the winds blow them. The winds vary from day to day, however, and stagnated air masses frequently absorb large quantities of emissions as they stay in place for a week or more. They then move on and subsequent rains wash out the pollution, hundreds or thousands of miles from their original sources.

Q: *How do smokestack emissions get into the higher atmosphere?*

A: In recent decades smokestacks have been built taller to prevent local pollution. One stack in Sudbury, Ontario, is a quarter of a mile high. The use of such stacks did curtail the highly visible local pollution, but it also permitted the dispersal of diluted emissions over wide areas, extending what were once local problems. Dispersed, invisible pollutants now come down far, far from their sources.

Q: *How do emissions travel long distances?*

A: They travel with the wind. Eighty per cent of the sulphur pollution in North America is generated east of the Mississippi. About half of the sulphur deposited in eastern Canada originates in the United States, particularly in the Ohio Valley — Pennsylvania, Ohio, West Virginia, Kentucky, Indiana and Illinois. American lakes have also been affected by pollutants produced in Canada.

Q: *How long has this been going on?*

A: Air pollution, at least on a local scale, has been a problem since the industrial revolution. In the late nineteenth and early twentieth centuries the metropolis of London was known as "The Big Smoke," and the residents of industrial towns grew accustomed to the destruction of plant and animal life in the immediate countryside. In recent decades, as industrialization grew rapidly, the problem of heavy local pollution was ameliorated, but the problem of widespread acidification of rain was created. In some areas of the northeastern United States and eastern Canada, the acidity of rain has increased in twenty-five years to a point where it is now forty times what was once the normal level. In the last decade and a half it has spread, and rainfall with high levels of acidity has been reported in southern California, Colorado and Florida.

Q: *Does acid rain affect everything (and everyone) in the same way?*

A: The fall of acid rain has varying consequences. Some geological areas are much more susceptible than others. Lakes in areas of granite or basalt bedrock (where there are few natural carbonates available as buffers) are particularly fragile.

The acids damage buildings, monuments and statues, especially those made of limestone and marble. They combine chemically with the surface of the stone, and the surface flakes off. Notre Dame, St. Peter's, and the Parthenon (which sustained virtually no damage through erosion in the previous two thousand years) have been greatly damaged in the last twenty years. Many newer buildings, such as the Taj Mahal and the

Canadian Parliament buildings in Ottawa, have also deteriorated.

The rain falling on forests and other non-farmlands could, in time, cause extensive changes in the soil chemistry. There is not enough information yet to make it possible to say exactly what the results might be, but there is no reason to think the changes will be beneficial. Laboratory evidence suggests strongly that a continued acid rainfall would measurably reduce forest productivity within fifty years. The polluting of the air with tiny sulphate particles can have a markedly adverse effect on persons with bronchial disorders and respiratory diseases. Acidic precipitation also leaches heavy metals such as mercury from rocks, and these can get into water systems supplying drinking water.

Q: *What can be done?*

A: A great deal. There is broad agreement in the scientific community that acid rain throughout much of the northern hemisphere is caused primarily by man-made emissions of sulphur dioxide and, to a lesser extent, oxides of nitrogen. Currently available technologies can do much to control these. Chemical "scrubbing" of the gases in utility stacks can, for example, remove over ninety per cent of the sulphur. There are also techniques which remove the sulphur from ores used in smelters. Nitrogen released from smoke-stacks cannot yet be effectively controlled, but several promising technologies are being tested. Devices exist which remove nitrogen emissions from autos. The problem may become less acute if energy conservation programs prove significantly effective or if non-polluting energy sources are developed on a wide scale. In the meantime, however, the need for controls is urgent.

Q: *Don't the Canadian and American governments have air pollution control requirements already in force?*

A: Both countries have clean air acts, but as they stand now, the laws cannot do the complete job. The Canadian Federal Government issues guidelines dealing with specific industries for provincial agencies. The province of Ontario has flexible laws and it has developed an extensive acid rain program for ore smelters and the publicly-owned hydro plants. The United States' federal law, the Clean Air Act of 1970, as amended in 1977, is designed mainly to control air pollution on a local or statewide basis. It requires the installation of scrubbers on new plants, but older plants are permitted to continue without controls as long as the ambient air in the vicinity of the plant is at an acceptable level of purity. To control emissions from older plants, the present law would have to be amended.

The First Signs Were Faint

In the 1950s, scientists began to notice a rise in the acidity of lakes. Some assumed that the changes in particular lakes were caused by beaver dams or storm-felled trees. In Scandinavia sportsmen found fewer fish in some waters.

In 1959 a Norwegian Fisheries Inspector named A. Dannevig connected the increased acidity with the decline of fish.

In 1965 researchers in Ontario found fish dying in lakes around Sudbury, the site of the largest nickel smelter in the world. Tests conducted between 1963 and 1969 at the Hubbard Brook Experimental Station in New Hampshire showed the water there had an average pH of 4.1.

In 1969 Swedish scientist Svante Oden traced the acidity in Scandinavian lakes to airborne pollutants from Great Britain, Germany and France. In 1970 Gene Likens of Cornell and F. Herbert Bormann of Yale reported increased acidity in the rain falling in northeast North America. The Canada Centre for Inland Waters in Burlington, Ontario, the country's largest water research centre, was monitoring the rainfall with a specially-designed bucket that opened automatically when it rained.

In 1975 the National Academy of Sciences in Washington, D.C., reported on the use of fossil fuel in power generators and its consequences. The report gave scientists concerned with plant emissions new basic data. In Canada the Department of the Environment concluded that the increasing acidity of rains and the susceptibility of tens of thousands of lakes on the Laurentian Shield constituted a major problem, and it set up a network of rain monitoring stations. The United States has a similar network and the United

A special bucket to catch the rain.

Nations has been working from the beginning to combine these and others into a global one.

As the networks grew, the perception of the problem continued to grow as well. Researchers at the Como Creek area in the Rocky Mountains near the Continental Divide found that the water pH there had dropped from 6 to 4.7 in twenty years. In the fall of 1979 the California Institute of Technology reported that readings in the Pasadena area had dropped from pH 7 to pH 4.4.

George Lake, Killarney Provincial Park, Ontario.

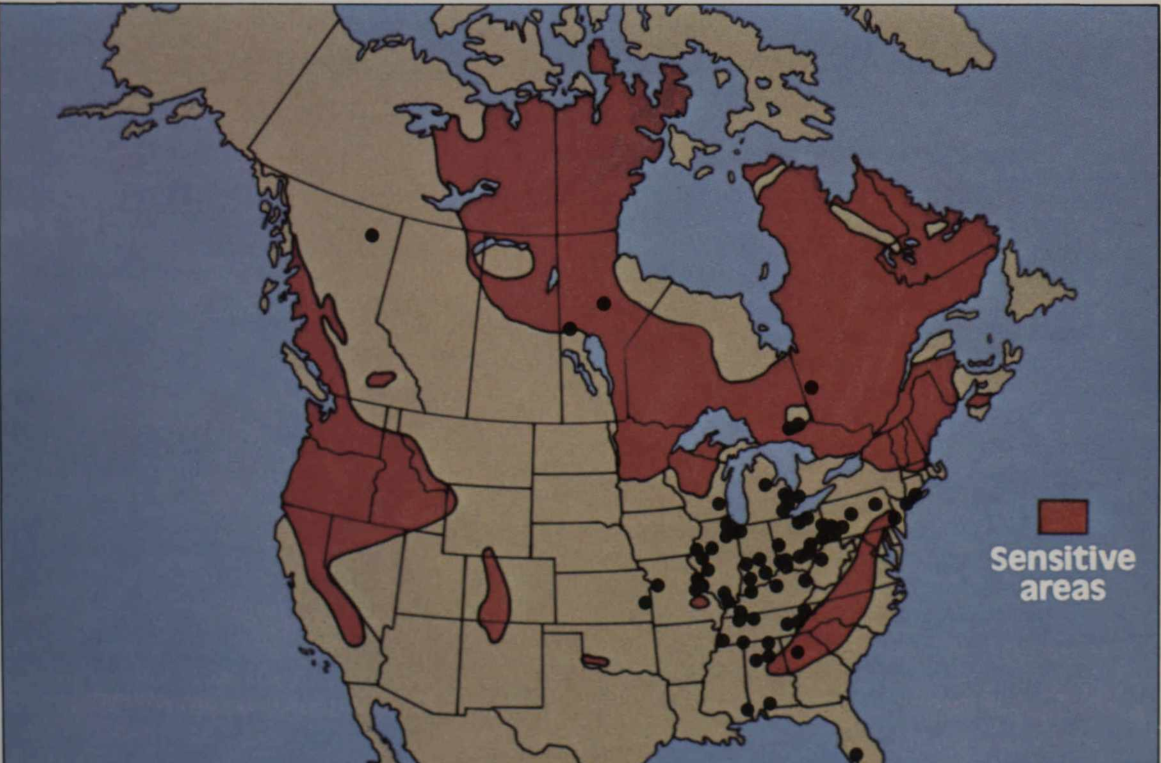
The Susceptible Lakes

Lakes get their water from the ground and from the sky. The rain can bring nutrients, which are usually good; and pesticides, metals such as lead, noxious chemicals and acids, which are bad.

Some lakes (including the Great Lakes) have pH levels of 7 or more and are not much affected by acid rain. These nestle in rocks such as limestone that are rich in carbonates which neutralize the acids that fall.

Unfortunately, many lakes in both the United States and Canada are in regions where thin layers of soil cover hard rock such as granite or basalt. The acid rains soon exhaust the limited amount of carbonate in the soil, and the lakes become increasingly acidic. The acidification process is generally made more lethal in the spring when the snows melt rapidly and the pH levels in the nearby lakes and streams drop abruptly.

The first victims as the acidity increases are usually the eggs of amphibians and fish. (The eggs of prized food fish such as trout are particularly susceptible.) As the waters grow more acidic, frogs die and bacteria disappear. Leaves and other plant litter that would ordinarily be decomposed by bacterial action pile up on the lake bottom,



The sections marked in red are low in natural buffers and are particularly susceptible to acidification. The dots indicate the areas having the heaviest concentration of SO_2 emissions, more than 100 kilotons per year.

disrupting the natural cycle by which decaying plants replenish the lake's nutrients. When a lake's pH drops below 5.5, the traditional plants begin to be replaced by mosses, fungi and algae.

The last thriving organisms to be affected may be adult fish. A lake may appear to be well supplied from the point of view of the fisherman (since there are no young fish, he catches only big ones) when, in fact, it is already doomed.

Most of the rain that now falls in the central lake regions of Ontario and upstate New York has pH levels of five or less. George Lake in Killarney Provincial Park, Ontario, is in a region of quartzite rock, surrounded by white mountains. It has been painted by artists since the Group of Seven focused Canada's attention on the wild beauty of the Ontario wilderness a half century ago. It teemed with fish in the 1950s. Its waters now have a pH level of 4.5. They are crystal clear but they support no life. There is scientific evidence that suggests that if the acid rainfall continues unabated, thousands of lakes in Ontario will be destroyed by the year 2000. The lakes in Minnesota's Boundary Waters Canoe Area, a million-acre wilderness, and across the border in Quetico Provincial Park in Ontario, are also under increasing stress.

If the rain lost its acidity tomorrow, some lakes that are now lifeless might recover their sweetness in a few years. They could be restocked with fish and plants, but it would be a difficult and expensive job and they would then be different lakes. Those lakes containing toxic metals leached from the surrounding soil by the acid may be permanently damaged. When ecosystems that took fifteen thousand years to evolve are destroyed they can never be restored. A part of North America's natural world that existed in our grandparents' time has been irrevocably altered.

Minnesota's Boundary Waters Canoe Area.

The Canadian View

John Roberts, Canada's Minister of the Environment, speaking before the American Association for the Advancement of Science early this year, noted that the effect of acid rain on Canada's eastern lakes "is simply disastrous." In excerpts below he makes the case for swift bilateral action:

The problem with acid rain is that our present level of knowledge is not regarded in some quarters as sufficiently conclusive to justify control action now. That is why the Federal Government has increased its acid rain research budget to forty to fifty million dollars over the next four years. But in the considered opinion of the Government of Canada and of the governments of the provinces most seriously affected, we know enough now to see that action to reduce the pollutants is required immediately.

Our problem is not knowing how *to reduce the emissions. We have the technology today which would enable us to put acid rain behind us.*

But the main problem is one of political will. In Canada, I believe we have the will to act. Just three weeks ago, for example, the Canadian Parliament unanimously passed an amendment to the Clean Air Act which deals with the Long Range Transport of Airborne Pollutants. We are moving to reduce emissions from Canadian industry and we are committed to that course.

But, acid rain is an international issue. Pollutants are not respecters of international boundaries. Even if we were able to completely eliminate our own emissions, we would still be receiving more than six million tons of these chemicals from sources in the United States — six million tons which today's technology can eliminate or at least reduce to safe levels. As a politician who is attempting to deal with a problem which is more than fifty per cent from outside our borders, I can only hope for the necessary ingredients of political will which can allow an international *resolution of this difficulty . . . . May I stress once again that the urgency is extreme.*

Nine Nova Scotia Rivers

Acid rain has already caused the extinction of Atlantic salmon in some Nova Scotia rivers.

During spring thaws pH levels in such rivers have dropped from six to four in a few days, and such an abrupt drop can kill the salmon eggs and larvae. The effect on the water is temporary — the pH may rise as rapidly as it falls — but the effect on the fish is permanent.

Dr. Walton D. Watt of the Canadian Department of Fisheries and Oceans reported on nine rivers in late 1980.

All have pH measurements below 4.7. Since there is angling data from the past hundred years, scientists have a clear idea of when the salmon became extinct. Until the 1950s the annual catch in some of these small rivers was 100 to 200 fish. By 1960 it was only half as many, and a decade later not a fish was landed. Rainfall chemistry data from the 1950s show that the acidity in the rainfall has increased tenfold during the period. Eleven other Nova Scotia rivers are considered threatened, and, given the current rate of acidification, Watt expects these salmon runs to be gone in twenty years. He says air trajectory studies show two-thirds of the pollution is coming from U.S. sources in Ohio and Pennsylvania, while one-third originates in the Canadian Maritimes.

Solutions

Short-Term

New York State, the Province of Ontario and Sweden are attempting to rehabilitate lakes by pouring lime into them.

The process is expensive—Sweden is spending (Cdn) $4 million a year on a pilot project—and to remain effective the treatment must be repeated periodically.

In Canada, with tens of thousands of susceptible remote lakes, the task would be overwhelming.

Professor Dwight Webster of Cornell is trying to develop new strains of brook trout with a high tolerance of acidity, and several strains of acid-resistant fish have been identified in northern California. These efforts have obvious limitations: no fish can live in a lake with a pH below four or one in which necessary nutrient-producing vegetation has been destroyed or toxic metals released.

Permanent

The only permanent solution to the acid rain problem is to keep the acid levels low.

Scientists agree that the only practical way to do this is to change energy use patterns—through conservation or the use of non-polluting sources—and to stop emissions at the source. Those from coal-burning plants can be controlled with varying degrees of success by using low-sulphur fuels, by removing the sulphur from the fuel before it is burned, or by "scrubbing" the gases in the smokestacks.

There are several methods for controlling emissions from non-ferrous smelters, where the ores may contain as much as seventy-five per cent pyrrhotite.

Scientists believe that effective controls can be applied now and that they should be. According to Hans Martin of Canada's Department of the Environment, it is "not practical to simply wait until the scientific program is complete," and Eville Gorham of the University of Minnesota says, "We already know that sulphur and nitrogen oxides are causing real damage. I think there's no doubt about that. They say we need more studies but if we wait for the last 'i' to be dotted and the last 't' to be crossed, more lakes will be lost."

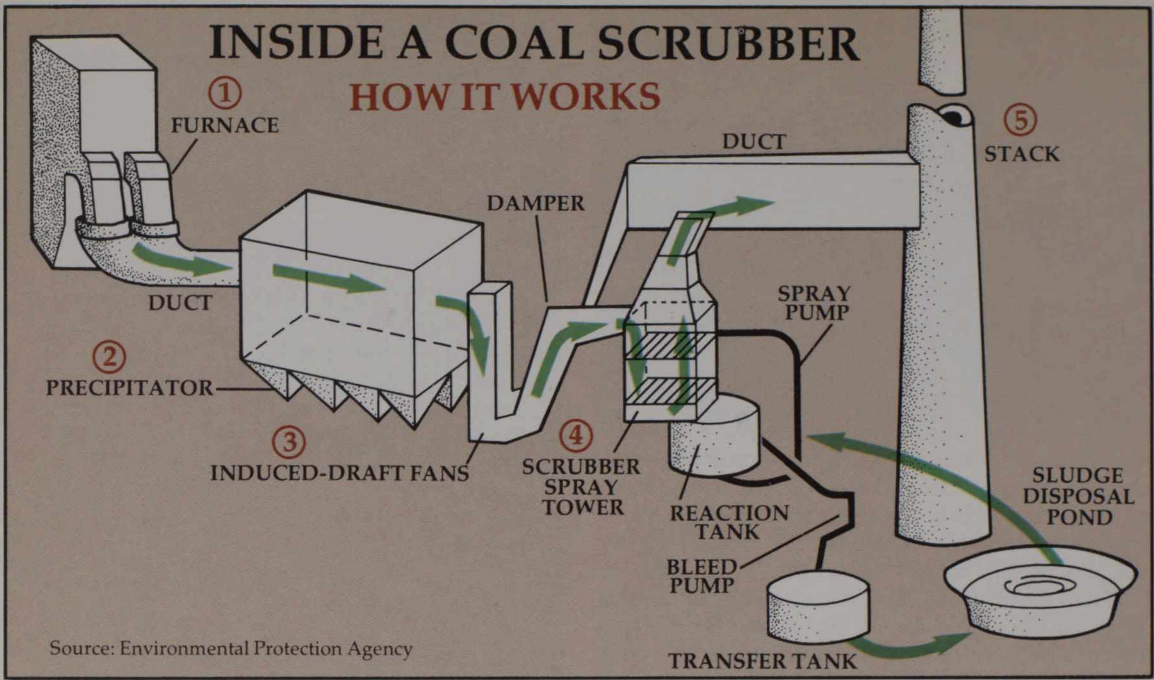
The Great Lakes Agreements

In 1972 the future of the Great Lakes was hazy and dim.

That year the United States and Canada signed the Great Lakes Water Quality Agreement. The difficulties were enormous: phosphorus from laundry detergents, sewage wastes and fertilizers was feeding the algae, and in Lake Erie the spreading algae were consuming virtually all the oxygen in the bottom water in the summer and overwhelming the fish. Industrial discharges and toxic-organic contaminants from industry and from farm run-offs were affecting Lake Ontario.

The other lakes were also showing signs of deterioration.

The coordinated efforts of the two countries, supported by stringent regulations, had positive results. By the summer of 1975 the two most endangered lakes, Erie and Ontario, were showing clear signs of improvement, and Erie's swimming beaches were doing a brisk business. In 1978, when the chemical problems were more fully understood, a new Water Quality Agreement was signed calling for more precise efforts. Much remains to be done, but there are now grounds for some satisfaction. Water quality has been improved and fish resources are being restored. According to the International Joint Commission's 1980 annual report, the words "chaotic, perilous and disgraceful" that once described conditions in the lakes no longer apply.



Coal is burned in furnace or boiler (1). Fans (3) pull resultant gases through precipitator (2) where fly ash is removed. Damper directs gases to scrubber spray tower (4) where slurry of water and chemicals is sprayed to remove SO_2 and remaining ash. Clean gases then go up stack (5). Liquid chemical used to absorb SO_2 drains into reaction tank where sulphur is removed through a chemical process. Bleed pump routes it to transfer tank from which it drains to sludge disposal pond.

The Japanese Example

In the late 1960s Japan had the most severe sulphur pollution problem in the world.

The health of Japan's people was being directly affected: residents of Yokohama and other power-generating centres were forced to wear gauze face masks when out in the street.

In 1967 the Japanese government issued its first control standards which limited the number of polluting particles. For control purposes the country was divided into seventeen areas, and specific levels for SO_2 emissions were set for each source.

Between 1970 and 1975 Japan's SO_2 level was reduced by fifty per cent while its level of energy consumption was increasing by one hundred and twenty per cent. In 1973 new goals were set, and the emissions limits have been revised downward almost yearly. New stringent nitrogen oxide emission limits have also been put into effect.

Most large plants have met the requirements by installing chemical scrubbers called Flue Gas Desulfurization systems. These remove over ninety-five per cent of the sulphur from the stacks. The number of scrubbers in use grew from fewer than one hundred in 1970 to over one thousand by 1975.

U.S. and Canadian Research

The Canadian government plans to spend (Cdn) $41 million on acid rain projects over the next four years, and provincial agencies also have extensive research and monitoring programs.

The United States Environmental Protection Agency will have spent $8.64 million during fiscal 1981 on projects concerned specifically with acid rain research. In addition, EPA and other U.S. agencies such as the Departments of Commerce, Agriculture and Energy have many additional projects related to the problem.

Below are a few of the studies being conducted in the two countries by a variety of governmental sponsors.

– The Canadian Forestry Service in the Department of the Environment is studying the impact of acid rain on a pulpwood forest near Quebec City.

– The Canadian Wildlife Service, Parks Canada and the Canadian Forestry Service (as well as other parts of the Department of the Environment) are conducting a study in Nova Scotia's Kejimkujik National Park of the impact of acid rain on the ecosystem near the headwaters of the Tusket, Mersey and Medway Rivers. These rivers are all downwind from industrial centres in the

United States and Canada. They were fruitful spawning grounds for salmon in the mid-1950s. Since 1974 they have been heavily acidic during the spring spawning season and salmon are no longer produced.

– The provincial governments of Ontario and Quebec, with federal assistance, are measuring the chemical composition of a large number of lakes to develop a model that will help scientists understand how lakes respond to acid loadings.

– Canada's Department of Fisheries and Oceans is studying the effects of acidification on a number of healthy lakes near Kenora, Ontario. At one (a nameless body of water designated as Lake 223) three metric tons of sulphuric acid have been added in the last four years, an amount equal to the acidification the lake would have received from precipitation in twenty years if it had been near Sudbury, Ontario. The pH has dropped from 6.5 to 5.6. The lake might still not be considered in critical condition at this pH level, but it has been significantly damaged nevertheless. Tiny freshwater shrimp and fathead minnows have disappeared, and the number of slimy sculpin has declined sharply. There has been an increase in embryo malformations among lake trout, and toxic heavy metals such as aluminum and zinc have been leached out of the rock by the acid and are now present in the water in increasing concentration.

– Ontario's Ministry of the Environment is studying a number of acidified lakes in the cottage country near Algonquin Park in Dorset and the impact of changes in them on recreation.

– The U.S. Environmental Protection Agency is studying the effects of acid rain on field crops. Preliminary findings show that it does not have harmful effects in the early stages and that it actually increases the yield of several crops, including corn and tomatoes. At higher concentrations, however, it can destroy plant tissues, remove nutrients from the soil, interfere with photosynthesis and affect the abilities of soybeans, peas and other legumes to fix nitrogen.

– Health and Welfare Canada and the United States Department of Health and Human Services are making separate epidemiological studies on the effects of sulphate particles on lung patients, asthmatics and schoolchildren.

The Atmospheric Environment Service of Environment Canada, the Ontario Ministry of the Environment and a number of U.S. agencies are cooperating in developing and testing mathematical models of atmospheric transport, chemical changes and fallout of acid precipitation and dust. These models are needed to predict effects on lakes and soils of increases or decreases in SO_2 of emissions in industrial areas thousands of miles away.

Official Actions and Reactions

The Canadian and United States governments recognized acid rain as a major problem in 1976.

In the United States Senator Max Baucus of Montana and Representative John Fraser of Minnesota, with the help of colleagues in Congress, persuaded the State Department to confer with Canada about a bilateral air quality agreement.

In 1978 a Bilateral Research Consultation Group was formed to coordinate the research programs in both countries on the long-range transport of air pollutants, including acid rain.

After a series of discussions, the two countries announced their intention to develop a "cooperative agreement on transboundary air quality" in July 1979.

The two countries already had a body of law and practice dealing with bilateral environmental issues, including the Great Lakes Quality Agreement (see page seven), which provided models for an air quality agreement.

In November 1979 eight hundred persons, including officials from both countries, attended an acid rain seminar in Toronto.

The same month John Fraser, then Minister of Canada's Department of the Environment, and Doug Costle, then Administrator of the U.S. Environmental Protection Agency, met in Geneva and issued a joint statement on acid rain in North America, acknowledging the extensive and irreversible damage that had already occurred.

In January 1980 there were joint consultations on Canada's concern about plans for conversion from oil to coal in U.S. industrial and utility plants. The impact of coal conversion on the environment was also discussed at the summit meeting of western leaders in Venice the following summer.

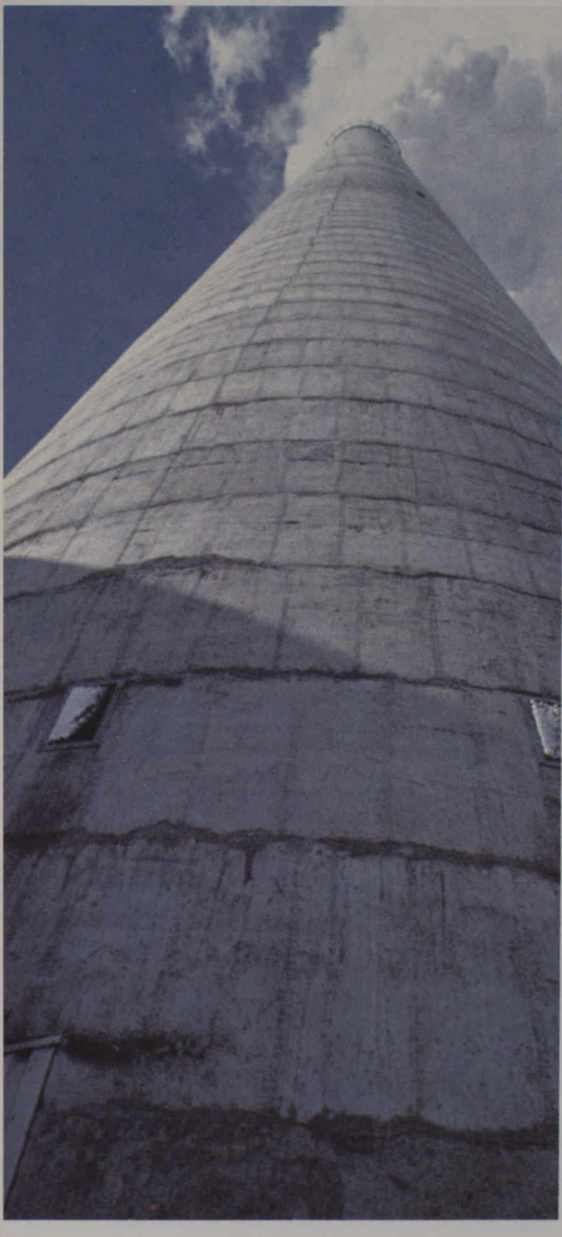
Last August, after a series of joint meetings, the two countries issued a Memorandum of Intent, announcing that an air quality agreement would be negotiated. Five specialized work groups would lay the technical foundation for the agreement, which would require the vigorous enforcement of anti-pollution standards, advance notice and consultation on activities, and cooperation in research.

Ontario

The provinces of Canada have the primary responsibility for controlling emissions of SO_2 and NO_x from plants and smelters. To a large extent, provincial standards are similar to federal guidelines.

However, following a recent change in Canadian law, the Federal Government has overriding authority to control pollution sources that contribute to transboundary pollution.

Ontario, which is both Canada's leading industrial province and the home of most of the damaged lakes, has been particularly active. It has appropriated about $5 million (Cdn) for acid rain control in fiscal 1980-81 and has played a major role in developing information on acid rain and in establishing controls.



INCO's superstack is more than 1200 feet high.

Last year it established two new acid rain monitoring networks at forty-five locations — supplementing its existing 1,400 instrument Air Pollution Index and Alert Systems. It has also worked to control the emissions from specific sources.

INCO

The Ontario government has worked with the International Nickel Company to control emissions at its Sudbury, Ontario, smelting complex. The complex, the continent's single greatest source of SO_2 emissions, has reduced emissions by forty per cent since 1969.

In September 1979 the province issued a regulation limiting the emissions at Sudbury to 2,500 tons a day, effective immediately, and ordered the company to reduce them to 1,950 tons a day by 1983, and then to make additional reductions to the lowest feasible level.

Ontario Hydro

Ontario Hydro, which supplies electricity to the province, is publicly owned. It uses partly washed U.S. coal in its coal-burning plants. This alone reduces sulphur levels by fifteen to twenty per cent. It also blends low sulphur coal from western Canada with U.S. supplies to reduce emissions. The utility has been a major source of both SO_2 and NO_x emissions, but the output of SO_2 per kilowatt hour has declined steadily during the last ten years.

In January the provincial government ordered a forty-three per cent cut in sulphur dioxide and nitric oxide emissions before 1990, and Ontario Hydro initiated a $500 million abatement program. It will include the installation of scrubbers and special burners to reduce nitrogen emissions at some plants, the purchase of hydroelectric power from Manitoba and the increased purchase of low-sulphur coal.

A Voice of Dissent

Spokesmen for utility companies and other contributing industries have generally resisted the scientific conclusion that the destruction of life in diverse ecosystems is caused by emissions from their operations.

Charles Taylor, an Ohio State air quality official, supports their position. Interviewed by *Audubon Magazine*, he said:

"What has happened to those lakes may be the result of a hundred years of human acidity. Maybe drastically cutting emissions right away won't make that much of a difference. I don't think another three to five years is going to make much difference. I don't think any lakes are going to be wiped out that quickly – well maybe some of the most critical (will be)."

PHOTO: ADIRONDACK PARK AGENCY

Some Progress Abroad

In November 1979, thirty-four member countries of the U.N. Economic Commission for Europe signed a broad agreement entitled, "The Convention on Long-Range Transboundary Air Pollution."

The Convention provides for the monitoring of pollutants and of rainfall, the sharing of information and cooperative research programs. It sets no specific goals and provides no enforcement machinery.

Armin Rosencranz of the Environmental Law Institute commented a year after the signing of the agreement on its results.

"In Geneva, the United States praised Scandinavian endeavors to focus attention on the acid rain predicament while resisting Scandinavia's efforts to impose specific standstill or abatement goals in the treaty . . . .

"Any such provision could require strengthening America's clean air regulations, already under pressure because of the shift to coal burning. West Germany has steadily resisted any proposals that would require adjustments in its domestic air pollution control policies, energy options or even measurement methods. The British are publicly skeptical about the urgency and the supposed irreversibility of the acid rain problem, even in the face of evidence showing that Britain may be contributing as much as sixty per cent of the sulphur compounds that Norway receives.

"Bilateral arrangements do not fare much better. Canadian-U.S. negotiators are far from a formal agreement after eighteen months of talks. Meanwhile the United States continues to send four times as much sulphur pollution to Canada as it receives from that country . . . . The prospects for the future look bleak."

"How Many More Lakes Have to Die. . .?"

(Roger Simmons, MP, Parliamentary Secretary to the Minister of the Environment, addressed a seminar on Acid Rain and Salmon in Portland, Maine, last November. Below are some excerpts from his speech.)

"We know the class and regional source areas of emissions in a general sense. We know where the sensitive areas are in both countries. And we have a reasonable appreciation of damaging effects on those areas. But we cannot now, and the scientists tell me that we will probably never be able to say that the emissions from this particular plant are killing the fish in this particular lake. Because we do not have this kind of information, the governments of both countries are open to criticism from certain interests that we are imposing a hardship on some sectors of the economy without knowing if it is necessary. My answer, and this is the official position of the Government of Canada, is that we cannot wait for a perfect understanding of the acid rain phenomenon before moving to control it. If we had waited back in 1972 for a complete understanding of the effects of phosphorus on the Great Lakes before starting our joint clean-up program, we would still be waiting and Lake Erie would be irreversibly dead. We know that we have been badly abusing some of our most precious natural resources and that abuse must be stopped. How many more lakes have to die before we get the message?"

The source of the Hudson River, Lake Tear of the Clouds in the Adirondacks, is acidified.

PHOTO: ENVIRONMENT CANADA

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