The Press and Global Environmental Change: An International Comparison of Elite Newspaper Reporting on the Acid Rain Issue from 1972 to 1992

Edited By

William C. Clark and Nancy M. Dickson

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CENTER FOR SCIENCE AND INTERNATIONAL AFFAIRS
AND
JOAN SHORENSTEIN BARONE CENTER ON THE PRESS, POLITICS AND PUBLIC POLICY

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Despite this assistance, some errors may remain. The responsibility for these is solely ours.

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THE PRESS AND GLOBAL ENVIRONMENTAL CHANGE: AN INTERNATIONAL COMPARISON OF ELITE NEWSPAPER REPORTING ON THE ACID RAIN ISSUE FROM 1972 TO 1992

Foreword

Almost everyone has an opinion on how the press covers public policy issues. Some people believe that reporters and their editors have a preconceived agenda and focus on those facts and stories that support that agenda, while others believe the press is more benign and has a limited effect in shaping public perceptions. Still others embrace the notion that press coverage reflects the biases and viewpoints of the government or the "establishment."

Environmental issues seem to trigger this debate over the accuracy and fairness of the media. Does the press deliberately exaggerate environmental threats? Are they beholden to one political interest or another? Where do reporters get their information? Why do they decide to pay attention to one aspect of a "story" rather than pursue a different tact? Finally, what factors tend to change a reporter's slant on an environmental issue?

Surprisingly, there has been a paucity of analysis about how the press covers environmental issues. Anecdotal descriptions are the rule, not the exception. Prompted by the vacuum in the scholarly literature and fueled by a generous grant from the IBM Environmental Research Program, scholars at Harvard's John F. Kennedy School decided to explore how the press in six different countries covered the issue of acid rain over a twenty-year period, 1972-1992. Under the direction of Prof. William Clark, teams of researchers were formed in six countries to analyze how one or two elite newspapers in each country selected for attention a subset of events, ideas, and perspectives related to the problem of acid rain and how it diffused these perspectives through society at large. The information obtained from each country was then compared to identify the similarities and differences between the countries.

This paper describes the results of this project. Professor Clark and Nancy Dickson plan to publish a book expanding on these themes which should be available in early 1997.

We at the Kennedy School deeply appreciate the confidence and support provided to us by IBM and particularly by Art Hedge (now retired), and Joe Sarsanski without whom this project would not have been possible.

Henry Lee

THE PRESS AND GLOBAL ENVIRONMENTAL CHANGE: AN INTERNATIONAL COMPARISON OF ELITE NEWSPAPER REPORTING ON THE ACID RAIN ISSUE FROM 1972 TO 1992

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Appendix 1

EVOLUTION OF THE ACID RAIN ISSUE

Nancy M. Dickson and William C. Clark

Appendix 1 includes a brief summary of the science of the acid rain problem as it is understood today, the present state of regulation, and a brief account of its early emergence.

Present State of Knowledge

Acid rain refers to the process by which atmospheric acids are deposited on the earth's surface. In this book, the term refers to air pollution that travels long distances and causes harm to humans and the environment as a result of direct acidic or corrosive effects or through mobilization of harmful chemical reactions. Sulfur dioxide (SO_2), nitrogen oxides (NOx) and ammonium (NH4) are precursor pollutants of acidic compounds formed in the atmosphere. When sulfur-containing resources such as coal and oil are burned, the sulfur combines with oxygen and is released into the atmosphere as SO2. Nitrogen oxides arise when nitrogen (N2) molecules in the air reach very high temperatures during the combustion of fossil fuels. The high temperatures cause N2 to split apart and react with oxygen to form nitric oxide (NO). Ultraviolet light from the sun then causes some of the nitric oxide to react again with oxygen and hydrocarbons to form nitrogen dioxide (NO_2). NO and NO2 are collectively referred to as nitrogen oxides (NOx). Ammonium (NH4) arises from ammonia emissions primarily from agriculture. Sulfur dioxide, NOx, and NH4 are all pollutants with harmful effects of their own. In the atmosphere, however, they undergo a chain of chemical reactions, transforming them into acids (sulfuric acid (HSO4), and nitric acid (HNO3)) which can then dissolve in rain drops, snow flakes, and cloud and fog droplets or return to the earth in dry particulate matter.

Normal rainwater in unpolluted areas is acidic with an average pH of 5.6 mainly because it is saturated with carbon dioxide (CO2).[1] Acid rain, however, is 10, 100 or even 1000 times more acidic with a pH of 2.5-4.5. Rainfall of pH 4.5 or lower is now common over large areas in the eastern United States and western Europe.

Volatile organic compounds (VOCs) represent another class of pollutants which can travel long distances and mobilize chemical reactions producing tropospheric ozone (O3) and other photochemical oxidants. (This ozone formation takes place in the troposphere and is distinct from the stratospheric ozone layer, which is damaged by the release of CFCs and other halocarbon chemicals.) These photochemical oxidants are secondary pollutants often called "photochemical smog." Although they do not directly contribute to the formation of acidic compounds in the atmosphere, VOCs are included in the discussion of acid rain because they can be transported long distances and because of their harmful effects. The major sources of VOC emissions are highway vehicles and solvent utilization.

Concern over the effects of acid rain varies between North America and Europe. In North America and Scandinavia, concern about the impacts of acid rain has focused on aquatic systems. Acid deposition can acidify lakes, rivers, and streams altering or even eliminating aquatic animal and plant populations. The extent of damage depends primarily on the amount of acid which infiltrates from the surrounding watershed or is directly deposited into the water body and on the buffer capacity of the underlying soil and bedrock. When surface waters become acidic (pH 6.0 - 6.5 and below), the low pH can cause reproductive failure in fish and amphibians and lead to decreases in species richness. As the pH falls to about 5.5 aluminum concentrations in the water increase and can reach toxic levels, causing further damage to aquatic life.

In central Europe, the impact of acid rain on forests has been the focus of concern. There is considerable scientific debate about the precise causes of forest decline, but a consensus has emerged that acid deposition and its precursor pollutants play a significant role as predisposing or contributing factors leading to forest decline. One hypothesis holds that acidification of the soil which can release aluminum ions may damage the fine root system of trees and impede the uptake of nutrients (Ulrich

1982). Soil acidification is also thought to cause vital nutrients such as calcium and magnesium to be washed away and can slow bacterial decomposition which is necessary for continued production of nutrients within the ecosystem. In addition, acid deposition can reduce the normal nutrient level available to trees by leaching nutrients directly from leaves or needles. This may result in nutrient deficiencies which alter the trees normal life and growth processes. Many other theories exist including the multiple stress theory. This holds that trees already stressed by soil acidification or weather extremes, such as severe frost or drought, are more likely to suffer severe damage when exposed to air pollution (ozone, acid mists, and acid precipitation).

Other effects of acid rain have also received attention including negative impacts on human health, visibility, materials, and agriculture. Ozone and acid precursors, particularly SOx and NOx, can cause respiratory damage to sensitive individuals including infants, the elderly, and people with pre-existing health problems. Acid rain can also pose health risks by corroding water pipes which may then release toxic metals into drinking water. Visibility can be affected by acid pollutants which can scatter, absorb and discolor light. This damages scenic vistas and jeopardizes the safety of air traffic. Damage to materials is also a significant problem as monuments and buildings corrode and weather at an increased rate as a result of acidic deposition.

Regulation

Four international agreements aimed at abating the risk of acid rain are currently in effect. These regulate emissions of SO2, NOx and VOCs. The Convention on Long-Range Transboundary Air Pollution (LRTAP) was concluded at Geneva in November 1979 and entered into force in March 1983 (Convention on.., 1979). (As of February 1, 1994 32 countries had ratified the treaty.)[2] This framework agreement recognizes the problems of air pollution. It has no legally binding commitments but says that Signatories shall "endeavor to limit and, as far as possible, gradually reduce and prevent air pollution, including long-range transboundary air pollution." In order to achieve this the "best available technology (BAT) that is economically feasible" should be used.

The Protocol to LRTAP on the Reduction of Sulphur Emissions or their Transboundary Fluxes was concluded at Helsinki in July 1985 and entered into force in September 1987. (As of February 1, 1994 19 countries had ratified the treaty.)[3] It commits each signatory to reduce its sulfur emissions or transboundary fluxes by 30% by 1993 with 1980 as a base year.

The Protocol to LRTAP concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes was concluded at Sofia in October 1988 and entered into force in February 1991. (As of February 1, 1994 20 countries have ratified it.)[4] It required a freeze on NOx emissions by 1995 with any year between 1980 and 1986 as a base line.

Most recently, the Protocol to LRTAP concerning the Control of Emissions of VOCs or their Transboundary Fluxes was concluded at Geneva on 18 November 1991. It has not yet entered into force. (As of February 1, 1994 6 countries had ratified it.)[5] This protocol committed states to flexible goals ranging from a 30% reduction to a freeze of VOCs.

Evolution of the Acid Rain Debate

As early as 1661, English climatologists observed that industrial emissions affected the health of plants and people and that England and France frequently exchanged wind-borne pollutants. They suggested remedial measures that included placing industry outside of towns and using taller chimneys to dilute air pollutants and to "spread the smoke into distant parts" (Evelyn 1661).

The term "acid rain" was coined by Scottish chemist Robert Angus Smith in his 1872 book *Air and Rain: The Beginnings of Chemical Climatology*, a detailed account of how precipitation chemistry in parts of England, Scotland, and Germany is influenced by such factors as coal combustion, decomposition of organic matter, wind trajectories, proximity to the sea, and the amount and frequency of rain and snow (Smith 1872). His work however received little notice until more than a century later.

Several discrete scientific efforts during the first half of the twentieth century served to expand the field of knowledge prior to the discovery of acid precipitation as a complex, interdisciplinary phenomenon. In 1911 two English scientists demonstrated that the acidity of precipitation decreased with distance from the center of the city of Leeds (Crowther and Ruston 1911). They associated the acidity with the combustion of coal and showed that plant growth and seed germination were inhibited by acid rain. In 1919 an Austrian soil scientist noted that substances falling from the atmosphere accelerated the acidification of forest soils (Rusnov 1919). During the 1920s a Norwegian limnologist reported on the relationship between trout production and the acidity of water in lakes and streams (Sunde 1926). In 1939, a Swedish scientist demonstrated the relationship between acidity and the toxicity of aluminum to fish (Erichsen-Jones 1939). In 1948 Swedish soil scientist Hans Egner established the first large-scale network for measuring precipitation chemistry in Europe (Egner et al. 1955). And, by the early 1950s, meteorologists in Sweden, England, and the United States had begun to search data from this network for evidence of atmospheric acidity (Barrett and Brodlin 1955; Parker 1955; Gorham 1955; Houghton 1955).

Then in the mid-1950s Canadian limnologist Eville Gorham, currently at the University of Minnesota, published a series of papers in England on the subject of acid precipitation (Gorham 1955). From his studies in Sweden and in northern England on the effects of rainwater on the health of ecosystems, Gorham concluded that acid in the rain near industrial regions was connected to industrial emissions and that increases in the acidity of aquatic ecosystems could be traced to acid precipitation. Despite the significance of his findings, Gorham's work received little attention.

Up until this point most scientists working in the field saw themselves as furthering the knowledge base in their own particular disciplines, not as contributing to a wider understanding of the acid precipitation phenomenon. Not until the late 1960s did anyone integrate knowledge from the different fields of science and recognize the complete problem of acid rain as it is understood currently.

The pioneer at integrating this information and publicizing the problem of acid rain was Swedish soil scientist Svante Oden. Oden had integrated information from a variety of disciplines and concluded that Scandinavian rivers were becoming increasingly acidic as a result of sulfur emissions from central Europe and Britain (Oden 1968).[6] Oden was the first to publish a complete theory of acid rain.[7]

With conclusions in hand, Oden set about to publicize the problem. In 1967 he described, in Stockholm's prestigious newspaper *Dagens Nyheter*, an insidious "chemical war" between the nations of Europe (Oden 1967). This article captured the attention of the press and prompted more stories on the subject. A year later, an article in *Ecology Committee Bulletin* stimulated further interest within scientific circles (Oden 1968).

By the early 1970s, Oden and his Scandinavian colleagues, appalled by the discovery that fish in their lakes and streams were dying from acidification, decided to bring the acid rain issue to the attention of the international community. Oden promoted scientific interest in North America with a series of lectures given in 1971.

The Swedes then presented their findings at the 1972 United Nations Conference on the Human Environment (UNCHE) in Stockholm (Bolin 1972). Although this *Case Study on the Environmental Impact of Sulfur in Air and Precipitation* was initially met with considerable skepticism, it began the slow process of gaining international political recognition of transboundary pollution problems. The Conference adopted Principle 21 of its Declaration which asserts that countries have an obligation to ensure that activities carried out in one country do not give rise to environmental damage in other countries (UN 1973).

The Organization for Economic Cooperation and Development (OECD) provided the technical basis to apply Principle 21 to the problem of acid rain. In April 1972, two months before the Stockholm Conference the OECD Council inaugurated a Cooperative Technical Program to Measure the Long-Range Transport of Air Pollutants in which 11 European nations participated (Austria, Belgium, Denmark, Finland, France, FRG, The Netherlands, Norway, Sweden, Switzerland, and the UK). The program estimated the domestic and foreign contributions to each participating country's sulfur deposition using 1974 data. The findings were the first independent verification of Scandinavian charges that imported air pollution were the primary source of sulfuric air pollution in Sweden and Norway (OECD 1977). National policy makers throughout Western Europe were alerted to the magnitude of transboundary pollution flow. In five of the eleven participating countries, more than half of the total deposition of sulfur was estimated to come from foreign sources. The major receiving countries were Sweden, Norway, Finland, Denmark, The Netherlands, Austria, and Switzerland. Major exporters, lead by the UK, denied the results. It was not until the 1976 Conference on the Effects of Acid Precipitation that British officials conceded the sulfur dioxide emissions from the UK could indeed reach Sweden and Norway (Telemark 1976).

North American concern over acid rain first emerged in Canada, when University of Toronto zoologist Harold Harvey provided documentation in 1972 of aquatic impacts of acidification in Ontario's Killarney lakes region. Harvey and company drew on the Scandinavian case study as a precedent for the kind of results they were reporting (Harvey and Beamish 1972). Despite Harvey's adamancy in trying to publicize the Canadian acidification problem, the acid rain issue continued to go unnoticed in policy circles.

At the same time, Gene Likens of Cornell University published the results of the first US study into the effects of increasing atmospheric acidification. Likens focused on the regional distribution of acidic precipitation in North America and its significance for aquatic and terrestrial ecosystems (Likens 1972). Two years later, in 1974, Likens and colleague Charles Cogbill authored a major article providing pH isopleth maps that indicated that precipitation acidity in the eastern US had increased dramatically in just two decades (Cogbill and Likens 1974). They reported that rain in the eastern United States was 100 to 1,000 times more acidic than normal and that the probable cause was the large-scale and widespread emission of sulfur and nitrogen oxides from industry and electric power plants. By 1976, when Cornell's Carl Schofield published his seminal work on fish kills in the Adirondack lakes, it was apparent that acid rain was indeed causing severe ecosystem damage (Schofield 1976).

An international agreement on air pollution was initiated by a statement of Soviet President Leonid Brezhnev at the 1975 East-West meeting of the Conference on Security and Cooperation in Europe in Helsinki, Finland. Brezhnev sought to address three problems: energy, transport, and the environment. The Soviets, under Brezhnev, viewed the environment as a way to cooperate with the West and to ease Cold War tensions in a relatively harmless way. The Scandinavian countries used the proposal as an opportunity to initiate international efforts to combat acid rain. Norway proposed that the conference should set forth a convention establishing the principles governing the

responsibility of European countries to control air pollution. Principle 21 from 1972 was referred to and the Nordic countries jointly proposed a draft text of a Convention in which they pressed for stringent and binding regulations on emissions of sulfur dioxide and nitrogen oxide. The United States, the United Kingdom, and West Germany, all net exporters acid rain precursors, opposed any agreement that included specific commitments to reduce emissions. The Soviets, in favor of an agreement, were careful that the negotiations focused on transboundary fluxes rather than total emissions since the USSR was a net importer of emissions. The resulting Convention on Long-Range Transboundary Air Pollution, concluded in Geneva in 1979, was a weak, compromise agreement in which the 34 signatory countries agreed to reduce their transboundary air pollution fluxes as far as possible. It did not enter into force until March 193.

Widespread public concern regarding acid rain outside of Europe first developed in Canada. In 1977, Canadian Environment Minister Romeo LaBlanc termed acid rain an "environmental time bomb" in a speech to air pollution experts in Toronto (Howard and Perley 1980). Canadians blamed much of the problem on emissions from American plants.

US-Canada governmental discussions began in 1978 as a result of an initiative from the US Congress regarding the impact of emissions from a Canadian power plant on the nearby Boundary Waters Canoe Area in northern Minnesota. As Canada successfully expanded the discussion to encompass the range of transborder pollution issues, the two governments established a "bilateral research consultation group" to coordinate research efforts. In October 1979 the first joint US-Canada scientific assessment on acid rain was released (RCG 1979). In 1980 the US started the National Acid Precipitation Assessment Program (NAPAP), a ten-year, half billion dollar research effort that was to look at current and future damages, alternative control and mitigation strategies; and scientific and policy issues. That year the US and Canada signed a Memorandum of Intent committing the US and Canada to work out an acid rain treaty.

A turning point in the debate over controls for transboundary emissions was when West Germany discovered serious *Waldsterben* within its borders in the early 1980s. In an unexpected reversal, West Germany became a strong proponent of strict sulfur controls at the 1982 Conference on the Acidification of the Environment in Stockholm, hosted by the Swedish government (Swedish Ministry of Agriculture 1982). This conference yielded important scientific and political results. Scientists agreed on a threshold level of sulphur deposition in sensitive ecosystems. This threshold was a precursor to the critical loads concept. Also, governments agreed that efforts should be made to reduce emissions of NOx as well as SOx.

In March 1983, the Nordic countries proposed that all countries reduce their SOX emissions or their transboundary fluxes by 30%. Following up this proposal ten states formed the "Thirty-Percent Club" at a conference in Ottawa in March 1984. These countries pledged to reduce SOx emissions by 30% and to reduce other pollutants substantially. In a new protocol to the 1979 LRTAP Convention in July 1985, 20 nations agreed to reduce sulfur dioxide emissions by 30 percent of the 1980 level by 1993. This Protocol, known as the Helsinki Protocol, came into effect in September 1987. The United States, the United Kingdom, and Poland, three major exporters of sulfur dioxide, refused to sign the Helsinki Protocol. Negotiations toward reduction of NOx began once sulfur agreements were underway.

Throughout the early 1980s attention remained fixated almost entirely on sulfur emissions rather than on nitrogen or other pollutants, even though these were increasingly being recognized as important contributors to acid rain. Finally, in the mid-1980s, scientists and policy-makers began to take the problems of nitrogen oxide emissions more seriously. After several years of negotiation, 26 countries

signed the Sofia Protocol in 1988, which required a freeze of NOx emissions or transboundary flows at 1987 levels by 1993. It also provided credits for reductions in previous years and allowed a number of countries to postpone compliance until 1994. A dozen countries promoted more ambitious targets and pledged to reduce their NOx emissions by 30%. In 1991, a regulation of VOCs was also agreed upon internationally.

Since 1990, however, acid rain has received much less attention internationally than during the 1980s. This may be the result of other environmental problems appearing more pressing, boredom with the issue, or the feeling that controls have been put in place and the risk has subsided. Nevertheless, international discussion continues on controlling transborder fluxes of air pollution.

Endnotes

1. The pH is a measure of acidity which ranges from 0 to 14. A Ph of 7 is neutral. A pH lower than that is acidic (0-6); a higher pH is alkaline (8-14). Because the pH scale is logarithmic, a decrease by 1 represents a 10-fold increase in acidity, a decrease by 2 represents an 100-fold increase in acidity, etc.

2. Countries in this project that have ratified LRTAP include Hungary, 9/22/80; USA, 11/30/81; Canada, 12/15/81; Germany, 7/15/82; and NL, 7/15/82.

3. Countries in this project that have ratified the Helsinki Protocol include Canada, 12/4/85; NL, 4/30/86; Hungary, 9/11/86; and Germany, 3/3/87.

4. Countries in the SL project that have ratified the Sofia Protocol include USA, 7/13/89; NL, 10/11/89; Germany, 11/16/90; Canada, 1/25/91; and Hungary, 11/12/91.

5. Countries in this project that have ratified the Geneva Protocol include the NL, 9/29/93.

6. In integrating information from several scientific disciplines, Oden relied heavily on the records of precipitation chemistry of Hans Egner, whose network had gradually expanded throughout Scandinavia and most of Europe and came to be called the European Air Chemistry Network. This network provided Oden with 20 years of data to analyze. Oden also drew heavily on the work of Swedish scientists, Carl Gustav Rossby and Erik Eriksson, for data on the trajectories of air masses. Rossby and Eriksson had founded the science of atmospheric chemistry in the early 1950s and were convinced that atmospheric transport and deposition were major mechanisms for the dispersal and chemical transformation of many substances (Kowalok, 1993, p.15).

7. Oden's initial conclusions were as follows: (1) acid precipitation was a large-scale regional phenomenon with well-defined source and sink regions; (2) rain, lakes, and seawater were becoming increasingly acidic; (3) air pollutants containing sulfur and nitrogen were being transported by winds over distances of 100 to 2,000 kilometers through several nations of Europe; (4) the most likely cause of acid deposition in Scandinavia was airborne sulfur blown in from Great Britain and East and West Germany; and (5) the probable ecological consequences would be changes in the chemistry of lakes, decreased fish populations, leaching of toxic metals from soils into lakes and streams, decreased forest growth, increased plant diseases, and accelerated damage to materials (Oden, 1968; Cowling, 1982; Kowalok, 1993).