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Transboundary Air Quality Relations

The Canada–United States Experience

John E. Carroll

The literature on air quality and international environmental relations, including Canadian–United States environmental relations, has burgeoned in the last decade, because issues of transboundary or transnational air pollution are now beginning to have an impact on the conduct of foreign relations. The rise of such issues on the diplomatic agenda also reflects increased environmental damage from transborder and transnational sources and an increased awareness of that damage. But the literature still lacks discussion connecting these transnational air pollution questions to broader concerns of the nation and society. Beginning with a general treatment that raises questions of sovereignty, this paper then takes the reader through the specific instances of Canadian-U.S. transboundary air quality history, attempting to describe the broader implications of what otherwise may appear to be purely site-specific matters of only local concern; to the much more serious question of acid rain, a question no less serious for its current sublimation under broader considerations of climatic change and global ozone layer problems; and thence

through some possible remedies appropriate to the broad nature of the overall challenge facing us all.

Air Quality and the Question of Sovereignty

From a political or public policy perspective, the much neglected relationship between policy decision making in air quality and the continuation of national sovereignty as we have known it is fundamental.

Transnational or transborder air pollution may be viewed as one of the greatest threats to the concept of national sovereignty and the notion of the nation-state yet to emerge. Nations appear to have less ability to contain air pollutants within their national boundaries than they have to contain any other form of pollution or, for that matter, any other threat that nations might represent to other nations. To date, air pollution, including the transnational kind, has neither been viewed nor treated as anything more than an irritant, an annoyance, in the field of international relations, and thus its threat to sovereignty has gone unrecognized. And yet there are now increasingly clear signs that air pollution, whether subnational or international, and certainly as a threat to life-sustaining climatic patterns and protection from dangerous radiation from the sun, should be viewed as no small or inconsequential threat to the future of humankind. International air pollution in the form of atmospheric acid may also be damaging the immediate health and welfare of individual humans and whole societies, yet nation-states are unable to protect the welfare of their populations.

Widespread atmospheric acid pollution must increasingly be viewed as a threat to national sovereignty and, indeed, to the very notion of the nation-state in its fundamental role of protecting the citizenry within its own borders. An example is the inability of the government of Norway to protect its people from increasing levels of premature senile dementia (Alzheimer's disease) resulting from high aluminum content in drinking water. This aluminum is being released from the granite bedrock underlying the water as a result of acidifica-

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tion caused by acid precipitation originating in the United Kingdom. As the problem worsens, affected Norwegians may well wonder how this air pollution from a foreign source differs from a military invasion. Both are threats to national security from external sources, and both place a burden of responsibility for protection on the back of government, which has thus far failed totally in securing protection from this serious external threat. Is there not, therefore, a question of violation of national sovereignty over which the violated society has no control? (Diplomatic complaint and protest bring no respite, and there is no way to reach the guilty party through economic sanction or other means. National sovereignty, therefore, becomes meaningless in the circumstance.) Many other such examples, direct and indirect, more and less serious, could be described, as air pollution and its more serious ramifications encircle the globe, its impacts worsening in an ecological system that may well be reaching its point of saturation.

Which is more important, national sovereignty or a more materially wealthy economy? And whither national security, whither the nation-state in this process? These are the fundamental public policy questions, while the health and welfare of people and ecosystems remain the more basic questions of survival. Increasingly it appears that a fundamental choice will have to be made. Nay, such a choice is now being made, and it appears to be on the side of material wealth at the expense of national sovereignty and security and, perhaps needless to say, at the expense of the health of people and their environment.

The protection of the health and welfare of a nation's citizens, and therefore of their environment, is a fundamental *raison d'être* of government. To the extent that government cannot provide such protection, it loses its reason for existence. And this is precisely what is happening in the arena of international environmental relations.

The recently signed (but not yet totally ratified) Montreal Protocol, it is true, stands as a highly publicized monument to unusual speed in international treaty making and has been widely praised for that speed and for some of its relatively strong language (when compared to the normally qualified language of treaties), but to suggest that it represents anything more than a minuscule action when placed against the problem at hand is to mislead. It is a major and praiseworthy action as far as treaties go. It is little, indeed, when matched against the problem it presumes to tackle. And indeed there were calls from both government and nongovernment sources to strengthen the treaty even before the ink of the signatories was dry.

We know that the great number of international environmental treaties and agreements extant contain little if anything that is legally or politically binding. Statements often contain qualifying words and

phrases such as "best possible," "available," and "in conformity with balanced development."[1] We know that, although in a narrow sense it is sometimes useful to think in terms of upstream-downstream and upwind-downwind relationships among nations and regions, ultimately we are all downstream and downwind, a circumstance elegantly borne out by global environmental problems such as international air pollution. Many of the consequences of such ecological cross-linkages are yet to become noticeable. Thus, on matters of global environmental problems, there are, realistically speaking, no such upstream-downstream, upwind-downwind relationships.

We also know that prevailing winds and water currents do not respect national frontiers and cross such frontiers without any effective containment. The only effective pollution control would be total elimination at the source.

We may well conclude that "a political organization which, in the face of unprecedented damage to forests, cannot succeed in enforcing such comparatively minor environmental measures as the immediate fitting of catalytic converters, the immediate provision of unleaded petrol, and the immediate installation of desulfurization systems in all existing coal power plants, is in definite danger of not meeting the cited criterion of what constitutes a state."[2]

We are thus faced with the dilemma of how to reduce or remove the threat posed to national sovereignty and thus to national security by the continued failure to control transboundary pollution. Lynton Caldwell suggested the magnitude of this dilemma when he stated that "effective environmental policy and cooperation require foresight and a transgenerational altruism that has been very rare among humans."[3]

This paper does not challenge the usefulness of national sovereignty (whether good or bad is not the point—it has been reality and presumably has been useful, has served a purpose, or it would not have existed), but rather suggests that the forces now lined up in opposition to its continued existence, with air quality–related matters in the forefront, are formidable and may even preclude its continued existence. This, too, is neither good nor bad—it is reality. Whether we continue to need political states is beside the point. And if sovereignty, if existing political state structure, declines, any notion of what would replace it could only be speculation. It is certain, however, that any vacuum left in its wake will not remain a vacuum for long.

With that notice of the magnitude of the challenge before us, let us turn to the case of Canada and the United States. Two of the most significant and most discussed incidents in the Canada-U.S. bilateral air pollution experience are Trail Smelter and Detroit-Windsor.

Trail Smelter

Transboundary air pollution has been a concern between Canada and the United States, albeit a very minor one, going as far back as the turn of the century. Citizens of both countries have long afflicted their immediate neighbors across the border and have done so in a manner no different from the activity of people farther removed from the border, the only difference being the location of the border in the region between pollutant emitter and pollutant receptor.

By far the most publicized and widely known of these incidents was the long, drawn-out Trail Smelter controversy in the 1920s and 1930s between British Columbia and the state of Washington. Trail Smelter, a case of Canadian industrial pollution from a lead smelter and its damage to American agricultural (orchard) production downwind, has been widely described elsewhere and will not be detailed here.[4] Though the incident was ultimately resolved and in the process created some precedent in international law, the long time intervals between affliction and retribution (spanning two generations) was so great as to cast doubts on the validity of this case as a success story in international environmental relations. Is justice served if the descendants of the damaged parties are compensated but not the damaged parties themselves? I think not. Trail Smelter is often held up as a true success story in international diplomacy and in the triumph of international law because it reached clear conclusion and is regarded as having established precedent. But its real contribution is questionable, and its contribution to succeeding experience is nearly nil, in spite of the space it occupies in journals and legal textbooks.

During the course of long, drawn-out negotiation, the problem at Trail came to be linked to other current matters of the day in bilateral relations, and the issue was ultimately transferred to the prime ministerial level in Canada. The clarity of the Trail experience is thus not as great as some believe. U.S. officials became convinced that unusual measures were necessary to end the conflict, including linking it directly with a trade agreement of great concern to Canada. The issue was therefore raised to higher political levels, much give and take ensued, and it was not until after the passage of some years that a bilateral agreement was reached, which paved the way for signing a joint economic agreement that had been linked to the pollution controversy.[5]

From the Trail Smelter issue, one of the very few transboundary environmental conflicts that reached such a clear conclusion, one learns that the wheels of international diplomacy move very slowly. Especially cognizant of this were the afflicted Washington farmers downwind, who received no compensation for more than fifteen years even

though their claims were recognized. Indeed, so much time had passed that the real estate executors rather than the farmers, who were by then deceased or retired, were the recipients of compensation. The case also shows that, though the conclusions of the International Joint Commission (IJC) were endorsed, the commission's role in the matter was incomplete. The real bargaining and significant decision making took place after it had disposed of the issue. Thus, although the Trail Smelter case can be presented as a success story in bilateral environmental relations, such an assertion must be qualified. The dispute might not even have been solved if the economic agreement had not been available to provide linkage.[6]

Detroit-Windsor/Sarnia–Port Huron

Another highly publicized case in Canada-U.S. air pollution is that of Detroit-Windsor, together with its somewhat questionable adjunct, Sarnia–Port Huron. Detroit-Windsor, by far the larger of the two, is a case of U.S. export of air pollutants across the border southward into Canada.

These deliberately linked issues have a rich history that has led to the development of some models of international cooperation in the form of an early IJC joint air quality monitoring reference,[7] and a model state-provincial agreement between Michigan and Ontario for mutual cooperation. This bilateral cooperation has been more an endeavor of mutual resignation than of mutual problem solving, but if a bilateral issue is "solved" either through joint improvement of the air or by joint resignation to its deteriorated condition, it is in fact solved.[8] Indeed, Canada–United States International Joint Commission findings indicate that Michigan-Ontario air quality has not improved and may even be worse than prior to the time of the agreement.

In the case of Detroit-Windsor, the International Joint Commission concluded in 1972 that pollution was crossing the boundary in sufficient quantities to cause harm, identified the sources, proposed preventive and remedial measures, and calculated their costs. Significantly, it concluded, above and beyond its terms of reference, that there was need for binational contingency plans for reducing emissions during adverse meteorological conditions; uniform procedures for air quality monitoring and data exchange; uniform air quality standards on both sides of the border; individual point source control in both countries; International Joint Commission responsibility for carrying out these tasks; and future research in a number of different areas, including fuel desulfurization and development of energy alternatives.[9] These conclusions have proven to be significant forebears to more recent ap-

proaches and problems. Joint contingency planning, joint monitoring, and data exchange have since become integral parts of binational air and water quality arrangements, although the two nations have yet to achieve uniform air quality standards.

By the end of the 1970s the IJC feared that the deviations from the trend of improvement since 1972 in the Michigan-Ontario case signaled that progress in improving air quality had slowed to a rate insufficient to meet its objectives or that air quality might have begun to deteriorate once again.[10]

What has been the value of the bilateral experience in the area of transborder air pollution? It has led to the development, through the IJC, of the hard data needed to understand the problem, has done so in a coordinated and internationally acceptable manner, and has focused much public attention on the nature of the issue. It has further provided new techniques and models for joint cooperation which have become even more important now that broader international air quality and water quality issues are arising in the 1980s. The IJC has also benefited from the experience because it is now better prepared for other air quality tasks elsewhere along the border. And in some ways most important, this reference to the IJC has caused government to request that the commission "take note of air pollution problems in boundary areas other than those referred to in the reference which may come to its attention from any source. If at any time the Commission considers it appropriate to do so, the Commission is invited to draw such problems to the attention of both Governments."[11]

This, of course, gives the IJC a standing reference, a watching brief, to enter into any transborder air quality issue and, in an advisory fashion, to invite a reference, thus assuring it an important future role in the air quality area. The IJC thus enters the scene as a major player in Canada-U.S. air quality relations.

For diplomatic reasons that deserve questioning, the situation of Sarnia (Ontario) and Port Huron (Michigan), just to the north of Detroit-Windsor at the point where Lake Huron drains into the St. Clair River, has been paired with Detroit-Windsor. The petrochemical plant complexes of Sarnia pollute the town of Port Huron and vicinity, albeit only when the wind reverses its normal course. Although significant for the residents of Port Huron, the magnitude of pollution involved in this transborder air pollution case is much smaller than that of Detroit-Windsor and represents balance with the latter in name only. The need of diplomats to show balance (that is, to show each country as sharing blame) is the sole cause of the misleading linkage of these two cases.

Far more significant in these cases is the acquiescence and complicity of the people of the receiving downwind country, the Canadians of

Windsor, in the continued occurrence of the transborder pollution, an acquiescence and complicity that truly cast doubt on the notion of a "sinner" and a "sinned against" party in these relationships. Canadians value their jobs in the polluting industries of both Windsor and Detroit, and the great number of Canadians who cross the border each day with their green cards (work permits providing a right to work in the U.S.) particularly value the steady income those cards (and that pollution) represent. Windsor people, for this and perhaps other reasons, have great tolerance of Detroit pollution and accept it as the part of their lives and material condition which it most certainly is. Hence there is a great quid pro quo which, though not abating the air pollution and its ramifications for damaging human health and property, does abate what could otherwise be a serious diplomatic problem. Consumers who use autos and petrochemical products, electrical energy, and many other goods all share some responsibility, as do those who are concerned for their jobs. To put it another way, in our role as consumers we all share in that responsibility; we are all involved in the problem.

It should not be assumed that downwind Canadian recipients of Detroit air pollution raise no objection to U.S. pollution. The Canadian outcry in the mid-1980s over Detroit's planned solid waste incinerator, immediately upwind of Canada, indicates that downwind Canadians do have some concerns which they pass on to Ottawa and more directly to Detroiters. But overall, as a result of great acceptance and tolerance, the damage goes on while both nations maintain a degree of quiet friendliness that does not support resolution of the problem. The health of the people of Windsor (and, as well, those of Detroit) is the ultimate issue. The cost is not calculated.

One may assume, therefore, that, from a conventional diplomatic perspective, a quid pro quo has been obtained, and on two levels: first, geographical, as between the so-called balance between Detroit-Windsor (U.S. damage to Canada) and Sarnia–Port Huron (Canadian damage to the U.S.); and, second, economic, as between the trade-off of the perceived economies of continued pollution which accrue to Detroit in the jobs it maintains and the production of capital it represents and the creation and maintenance of jobs for the people of Windsor and other Canadians working in Detroit. We have a quid pro quo, a balance, and thus diplomatic resolution (albeit with occasional disturbances to that balance), but no balance whatsoever with regard to a deteriorated and deteriorating environment and human health. Such deterioration is not a diplomatic issue, however, because it is accepted by both nations. Neither nation would necessarily express its acceptance in those terms, but both do so in their actions.

There have been a series of lesser bilateral air pollution incidents in Canada-U.S. relations which are regionally very significant and in each case teach broader lessons to both nations. These include the cases at Atikokan (Ontario-Minnesota), Poplar (Saskatchewan-Montana), and Cornwall (Ontario–New York).

Atikokan

The only difference between a transboundary or transnational air pollution problem and a purely domestic one is that a pollution source is located at or near the border and a cooperating wind or air movement carries the pollution across that border. Real or perceived vulnerability to damage by a downwind complainant population assures the existence of a diplomatic problem. And as diplomats having experience with the Atikokan air pollution controversy between Canada and the United States can attest, in matters of diplomacy, perception is reality and must be accepted as such in negotiation, regardless of what science has to relate on the subject.

Ontario Hydro's proposal in the late 1970s to establish a large coal-fired power plant without emission controls and for purposes of economic development in lightly populated northwestern Ontario set off a controversy that presaged the 1980s acid rain and other international air quality debates. The controversy was not conducted between two national governments, but rather between the Canadian and Ontario governments on one side and U.S. citizen environmentalists on the other. The latter group was represented by a most reluctant U.S. government that was grudgingly pushed and dragged into the fray by its vociferous and well-organized citizens. It had no alternative, even though it saw likely damage to U.S. interests to be minimal. That those damages were perceived to affect a beloved northern Minnesota wilderness, the Boundary Waters Canoe Area, was critical, and much of the transnational debate between U.S. environmentalists and Canadian provincial and national government bureaucrats and diplomats revolved around other than purely localized, site-specific damage, a rather new and unaccustomed concern at that time. It also involved subtle and cumulative damage quite different from the damage causing immediate and obvious concern that had characterized so many earlier transboundary pollution problems.

This large power plant at Atikokan, designed not to fulfill a power need but to create a new market, has not been built and the damage has not materialized, but the debate was critical for it raised the arguments and set the stage for much of the acid rain debate of the 1980s. The

supreme irony of Atikokan is, however, that, had it been built, its greatest probable impact would have been as a Canadian contributor to continental acid rain loadings much farther downwind, and it would have ultimately weakened Canada's anti–acid rain arguments before the United States and the rest of the world.

Atikokan stands as perhaps the last instance of Canada's flexing its economic muscles at the end of the 1970s and raising the ire of organized and vocal U.S. environmentalists. As Atikokan passed from the scene, the bilateral acid rain debate was just beginning in earnest, but, as we will see, the protagonists were in reverse, Canada now the environmental complainant, the U.S. the resource-exploitative defendant.

An answer to the question, What have we learned from Atikokan? might be that, as William Steggles of the Ontario Ministry of the Environment has written, "the problem of acidic precipitation cannot be addressed by writing laws and implementing procedures to deal only with new developments—most importantly these efforts must be part of a far greater total commitment to correct existing sources. . . . We must not make it easy for existing sources to hide behind protective laws, with grandfather clauses, that delay achievement of new goals."[12] This answer refers to the fact that Atikokan, a new plant, has been under heavy fire by a country that, in its own air pollution and acid rain policy has exempted old plants, through a "grandfather clause," from the stricter requirements applicable to new plants. Thus the United States was asking Canada to apply strict rules to Atikokan as a new emitter but was itself exempting its many old polluters from much the same rules. This leads to one of Canada's and Ontario's principal concerns vis-à-vis the Atikokan issue. The United States was complaining to Canada about one plant in a large, remote region while at the same time it was spewing much greater tonnages of the same pollutants toward Canada from its urban-industrial complexes around the Great Lakes, the Ohio Valley, and elsewhere. This fact has been a major contributor to the bitterness and defensiveness to be found in the Canadian reaction from the very beginning. U.S. diplomats, though aware of the situation, were not able to do much about it, being under pressure to respond to both environmental and economic pressures.[13]

Before moving on to acid rain, we must briefly view a few other cases, for there is no lack of past, present, and likely future episodes of local transboundary air pollution along the Canadian-U.S. border, given the great length of the border and the variable direction of winds. On the plains west of Atikokan, the infamous Poplar Power Plant controversy between Saskatchewan and Montana raised not only air pollution but water pollution and water supply problems as well.

Poplar

The Poplar Power Plant in southern Saskatchewan is a large coal-fired plant built without sulfur emission controls and located so close to the international border as to be visible from Montana. It lies within an agricultural area with a very small population, is dependent on vast reserves of local coal, and is critical to Saskatchewan's plans for industrial development and economic diversification. Much of the plant's effluent, liquid and gaseous, travels across the border into Montana. Poplar's aquatic impacts are greater than its atmospheric ones, but there has been no lack of U.S. concern over those not inconsiderable sulfur dioxide (SO_2) emissions.

The crux of this bilateral issue is attitudinal and legal. The more purist "no significant deterioration" attitude of the United States, regardless of the condition of the receiving air, comes up against what some would call the more realistic Canadian attitude, which attaches greater weight to the existing ambient air quality and the ability of the receiving air to absorb (and dilute) additional pollutants. Current U.S. laws state that the best available technology must be used in this case (and would be if the plant were being built in Montana), regardless of need (that is, regardless of the condition of the local air). Canadian rules specify that the best practicable technology be employed, taking economics into account. In this case, because low sulfur lignite coal will be used, and because Saskatchewan and Canadian SO_2 standards will not be exceeded, it is not legally necessary in Canada (and would be highly uneconomic) to install expensive SO_2 scrubbers.[14] And it should be noted that Montana's concerns over receiving those emissions, like Minnesota's with Atikokan, were not totally restricted to ecological matters but were also related to infringement of Montana's (and, with Atikokan, Minnesota's) own rights and opportunities to enjoy further economic development and thus need for the atmosphere to have the capacity to dilute and disperse pollutants.

Perhaps a telling irony of the Poplar affair was the experience of Saskatchewan Power Corporation's coal-fired power plant at Estevan some ten years earlier, which drew virtually no objection from downwind North Dakota, although the damage from contamination of North Dakota crops, livestock, soils, and human communities, actual and potential, was probably as great. One might speculate that the decade earlier in time, a period of lesser environmental consciousness, and perhaps the difference in environmental concern and sensitivity of North Dakotans as compared to Montanans, played major roles. Thus there is another example of perception playing a superior role to reality, science indicating likely damage which the recipient population did not develop concern about (or even think about).

Poplar has further significance in that it was this experience that led Montana to call in the late 1970s for a U.S.-Canada bilateral air quality agreement designed to protect border regions from such threats in the future. By later that same year, however, it was Canada that took the initiative, acid rain being the immediate cause. As we will see, by late 1980 the first bilateral Canada-U.S. air quality agreement was in place, that pertaining to acid rain. It did not pertain to site-specific transborder air quality problems but had implications for such if it had not effectively died in the summer of 1982. Poplar and Montana's defensive initiative opened the path for the successful negotiation of this famous though short-lived first-in-history Canada-U.S. air quality agreement, the Canada-U.S. Memorandum of Understanding on Acid Rain, signed in 1980.

Cornwall

An eastern site-specific transborder air pollution problem deserving mention is that of Cornwall Island in Ontario–New York.

Years of complaint by members of the St. Regis Band of Mohawk Indians, whose reservation occupies the entirety of Cornwall Island in the St. Lawrence River immediately downwind of the U.S. Reynolds Metals Aluminum Smelter in New York, eventually led to reluctant attention by Canadian government officials and diplomats who were asked to protect the rights of these native Canadians. Concerns over damage to livestock eventually turned into more serious concerns over human health from fluoride contamination from the aluminum plant's emissions. The plant operates legally within New York State's fluoride emission standards. The U.S. has no national standards for fluoride. Ontario has somewhat tighter ambient air quality emission standards, which would be violated were the plant in Ontario. Given evidence of some damage to the health of these native Canadians (precisely how much is not clear), Canadian diplomats eventually lodged a complaint to the U.S. But as long as the company is within state and federal law (which it is), there is little that U.S. diplomats can do. In fact, the U.S. State Department must protect the company's interests from across-the-border threats to its operation. Cornwall Island thus presents the dilemma of how to respond to charges of pollution damage from across the border when the alleged polluter is operating within all federal and local laws.

The significance of Cornwall Island, aside from native peoples' concern, is perhaps that it highlights the incomplete nature of U.S. air quality statutes (considered by many to be the world's best). Cornwall

teaches that, even when fully implemented, those statutes are not capable of solving the problem.[15]

Economic Rather Than Environmental Concerns in the Site-Specific Air Quality Disputes

Not all of this attention to ecological damage was motivated purely by environmental protection concerns. At least some of it stemmed from the desire of certain regions planning economic development to secure protection of their rights to develop and to ensure an established set of rules by which they could operate and which would in turn reduce uncertainty for investors. International rules, in air quality as in other areas, can be useful not only to provide protection for the environment but also to provide equal protection for developmental activities. In this vein Saskatchewan asks why it should have to expend vast sums of money to avoid pollution and thereby be less competitive with Ontario, while not enjoying the advantages Ontario has had over the years to develop and pollute. Hence Saskatchewan has fought for the application of Best Practicable Technology rather than Best Available Technology. To ensure the acceptance of this control philosophy internationally as well as domestically, it has opted for supporting the establishment of organized rules, for a guarantee of an ordered and orderly relationship, and for a protection of its right to develop. An international air quality agreement laying out such rules and thus guaranteeing order and providing the desired protection is clearly in the best interests of Saskatchewan.[16] Similar sentiments might well be expressed by Alberta, British Columbia, or even northwestern Ontario, or indeed any heretofore underdeveloped border region of the United States that has been left blinking in the dust as high-growth areas have expanded and diversified rapidly.

Although the U.S. Clean Air Act Amendments of 1977 (which are still the law of the land) exclude foreign source pollution from U.S. emission calculation levels and therefore cannot technically be viewed as a threat to economic growth, nevertheless domestic pollution levels become that much higher with the addition of such foreign sources, with the health and environmental damage that that implies. They therefore still pose threats to domestic growth, particularly in border states and provinces. Hence there is good reason for alliances between environmental, health, and industrial groups. A political alliance of these often divergent groups has succeeded in focusing public attention on transboundary air pollution and the need for international ground rules in this until recently largely ad hoc area. Sufficient interest devel-

oped in both countries[17] for the passage of a number of resolutions[18] on this subject in various legislative bodies. The U.S. Senate even attached a rider to the Foreign Relations Authorization Act of 1979 which mandated the State Department to begin diplomatic negotiations leading toward such an international agreement.[19] Then the public hue and cry over acid rain became so intense and the demand, particularly from Canada, for negotiations on this subject became so outspoken that all attention focused on it. With the advent of formal negotiations in this area at the start of the new decade of the 1980s, the separate history of transboundary air pollution came to a close and the two issues were joined as one.

Site-Specific vs. Long-Range Transport: The Case of the Great Lakes

Issues involving site-specific transborder air pollution will continue to develop and will remain as diplomatic questions until the necessary diplomatic (and not environmental) quid pro quo is established. They will then be viewed as diplomatically contained and no longer a matter for concern. Of far greater significance, however, is the question of long-range transport of air pollutants and the much more pervasive effect they are having and will continue to have on our lives, our societies, and the essential meaning of our notions of the nation-state and national sovereignty, for they threaten the existence of national sovereignty as no other threat short of military invasion and occupation have been able to do.

The Great Lakes of North America are normally assumed to encapsulate many lessons in water resource issues and management and are certainly a major part of the North American site-specific bilateral air quality experience. And yet these same Great Lakes in recent years have taught us much of fundamental value about the nature of the threat of long-range air pollution transport as well. It was in the late 1960s to early 1970s that the International Joint Commission first determined that the greatest single source of water pollution in that large, rather pristine Great Lake, Superior, was air pollution. And though the shores of Lake Superior do not have the population or industrial development to be found in the lower Great Lakes, nevertheless the effluent loading from Duluth-Superior and a number of Canadian cities is not inconsequential. A quick survey of air pollution sources near the lake quickly reveals few local sources. Hence the source of this air pollution to be found in Lake Superior is long-range transport, likely from distant U.S. and Canadian points to the west, northwest, and southwest and with

some not insignificant dosage from the south and east when the wind turns. (In fact, the Minnesota Twin Cities of Minneapolis–St. Paul report that their greatest single source of air pollution annually is the city of Chicago, which is downwind of their region. When the wind turns, as it can at any time, however, the dosage it carries northwest is greater than from any other single source coming into the Twin Cities from any direction. Downwind sources must not, therefore, be ignored or discounted in the calculation of transboundary air pollution problems.) All of the Great Lakes are now contaminated with mirex and other highly toxic substances which have no point of origin nearer than eight hundred to a thousand miles, and that source is to the south, where mirex is applied in agriculture to control fire ants. The origin of the contamination is, indeed, air pollution. Finally, we learn from the Great Lakes that the air-water system also works in reverse of the normally assumed manner, namely, that water pollutants evaporate upward as gases and enter the air column, ultimately contaminating land (and people). In other words, water pollution can be a source of air pollution, a scientific finding of no small consequence to Canadian and U.S. residents living downwind of highly contaminated Lakes St. Clair, Erie, and Ontario and a finding that has thus far played no role whatsoever in the formation of public policy. The consequences of these lessons taught to us in the Great Lakes, but by no means limited to those lakes or that region, will bear their fruit and be suffered for a long time to come. The extent to which these events represent a transborder or diplomatic problem largely depends on the imbalance that results on either side of the border by those afflicted and by those perceived as being responsible for the affliction. To the extent that the two are balanced, there is no transboundary environmental problem and we simply all suffer the consequences together.

Long-Range Transport: The Case of Acid Rain

In 1978, some ten years after the Scandinavians raised the problem in the European context, Canadians began to evince concern about acid rain (acidic precipitation) and the damage it was doing or might be doing to their environment, their livelihood, and ultimately their health. Two years later, by 1980, some U.S. residents, notably New Englanders and a few New Yorkers and Minnesotans, all resident in regions perceived vulnerable to damage, raised similar concerns, opening a great public policy debate which by now has lasted more than a full decade. Perhaps never in history has there been so much rhetoric and education and so little real action as has occurred in North America in the decade of the 1980s over the acid rain issue.

Diplomatically the issue went far to reverse the role of the two governments relative to each other. During the 1960s and most of the 1970s, Canada was developing and exploiting its natural resources, its minerals, its forests, and its energy resources at a very rapid rate with virtually no environmental strictures or constraints of substance. During these decades Canada increasingly had the ability on its own to engage in resource extractive development, a condition that did not always exist in the past, and she made use of this ability. Her per capita and her net total air pollution emissions, both domestic and transborder, increased accordingly.

During the same period, and particularly after 1970, environmentalism as a political and broader social movement was taking hold in the United States, largely in response to increasingly worse pollution episodes in various parts of the U.S. and a decreased willingness to tolerate them any longer. The result was some decrease in U.S. source pollution emissions during this period and an inevitable clash between Americans and Canadians over environmental questions, especially in the western border regions. Canada, albeit smaller in population and with less capacity to pollute, was increasingly coming to be viewed as the sinner and the U.S. as the sinned against.

In 1978 the tables turned dramatically. The cause was the then still little-known phenomenon of acid rain. During most of the 1970s, even though the U.S. had (and has always had) the greater ability to affect Canada, the basic perception was that Canada was doing more ecological damage to the U.S. than vice versa. The reason relates largely to the difference in timing of the two nations' national evolution vis-à-vis environmental concern. The 1970s had been a decade of environmental concern for the U.S. and simultaneously a decade of great resource exploitation for Canada. A clash between the two nations became inevitable. Thus the groundwork was laid for Poplar, for Atikokan, for Cornwall Island, and for a host of other site-specific transborder environmental problems.

With the demise of the environmentally sensitive Carter administration in the U.S. and the advent of concern about acid rain in Canada, the situation reversed. The afflicted Americans were all of a sudden the aggressors, and the resource-exploiting Canadians were quite suddenly the environmental victims. The calculus of acid rain is specific on this point—the U.S. causes well over 50 percent of Canada's acidic pollution and Canadians cause less than 20 percent of U.S. acidification. Further, there is no doubt that Canada is geologically and chemically more vulnerable to damage than the U.S., at least in the near term, and is thus a justified complainant. (The areas of the U.S. highly vulnerable, New England, northern New York, and northern Minnesota-Wiscon-

sin, were early prone to identify with Canada and politically side with Canada against overwhelmingly superior political forces in the U.S.)

Canada, the complainant on the North American acid rain scene, has a number of very good reasons for complaint: [20]

1. Canada is one of the most vulnerable nations on earth when it comes to damage from acid deposition, in both aquatic and terrestrial environments. The U.S. is quite the opposite, or at least thus far perceives itself to be (which is the same thing in diplomacy and politics). For these reasons of differences in vulnerability, the people of the U.S. are significantly less aware of and less interested in acid rain and its possible effects than are their Canadian neighbors, and because many Americans across a vast portion of the country are also dependent on the problem-causing gaseous emissions for the sustenance of their economies, there is a lack of openness to learning about the problem in these regions.
2. A second factor underlying Canada's complaint is the imbalance of pollutants moving back and forth across the border. Although each nation contributes to the other's acidity, the U.S. is responsible for at least 50 percent of Canada's total acid deposition, spread over a vast area, while Canada is responsible for less than 20 percent of U.S. acidic deposition, and this is largely restricted to northern New York and New England.
3. As a result of their downwind position and vulnerable environment, the Canadian people have been far more aware of the problem, its causes, its likely effects, and its role in bilateral relations than have the American people.
4. Canada is much more dependent on forest products and forest exports than virtually any other nation in the world, and these resources are at risk from acid rain.
5. A factor not well understood by Americans but close to the hearts of Canadians is the impact of acid pollution and particularly the aquatic damage discovered in the Muskoka Lakes–Haliburton Highlands region of Ontario, an area whose natural beauty has provided the inspiration for many of Canada's leading artists and literary figures and which comes perhaps as close as any one area could be to a culture hearth for the Canadian people. It is at risk from foreign pollution sources, a critical factor in the early development of Canadian views on acid rain.

Thus, for these reasons and because of the cost of significantly reducing emissions, there has been an insufficient constituency in the U.S. to take action to reduce emissions even though substantial damage is caused in the U.S. by air pollution and there has been a sufficient

constituency to ensure further publicly funded U.S. research into the effects of acid rain and perhaps a constituency to support some research and development into low-polluting coal-burning technologies as well. Canada's considerable grass-roots constituency for action has led to that country's steady international leadership on this question and to its strong linkages to Sweden, Norway, and other like-minded nations. In contrast, although the U.S. position might be likened to that of the United Kingdom, the U.S. administration has paid relatively little attention to the issue and has rejected the consistent demand from New England, New York, and a few other areas that action be taken.[21] U.S. congressional obstructionism from representatives of coal-producing states, both Republicans and Democrats, has been a factor as well.

Canada's position as a very vocal (and authentically concerned) complainant on this issue lasted well into the mid-1980s, when, with the demise of the Trudeau government and the strengthening of Canada's desire for free trade with the United States, the debate became tempered because Canada could not afford to have irritants get in the way of its desire for free trade with the U.S. And ironically there has been virtually no discussion, even in Canada, of the fact that free trade leads naturally to increased consumption, and increased consumption in turn leads naturally to more acid rain. Is it not inconsistent and perhaps irrational for a nation purporting to be concerned about acid rain to opt for free trade or fail even to make the linkage between the two? Signs of some movement by the Bush administration, albeit very limited movement and slow to take effect, have further weakened Canadian diplomats' previously strong determination to maintain leadership not only in North America but in European and broader international forums as well.[22] The acid rain debate now appears less in the news as it is subsumed by much broader global environmental challenges which incorporate but are by no means limited to the narrower context of acid rain.

The North American debate continues to rage around proof of cause and effect, the uncertain role of acid rain in conjunction with other pollutants and natural sources, who is doing what to whom, what the cost will be, who should pay the cost, and what is the best remedy. Remedies are being addressed almost exclusively in terms of a "technological fix." There has been virtually no suggestion in North America, not even in Canada, a most endangered complainant, that the problem, its consequences, and therefore its remedies, may be much bigger and broader than has previously been assumed. Nor that there may indeed be a linkage between acid rain, nuclear waste storage issues, toxic air pollution, toxic water and groundwater aquifer contamination, water pollution derived from air pollution, and even air

pollution toxins in some instances being derived from water pollution in the Great Lakes and elsewhere in North America. Nor that acid rain and these other problems may only be symptomatic of the heavy pressure now being exerted by both Americans and Canadians on their environment. Nor that acid rain or similar alternative problems and their consequences may have to be accepted if that pressure continues.

The infinitely broader issues of climate warming (heat trap or greenhouse effect), of holes in the earth's stratospheric ozone layer, and of much broader aspects of long-range transport of air pollutants than just the acid rain gases, SO_2 and nitrous oxide (N_2O), are now subsuming acid rain as a public policy issue. This is not to suggest, however, that early action on acid rain would have been premature or unjustified. The precursors of acid rain are basically the same as the precursors of the broader issues, including climatic warming. All of these issues are very much connected to fossil fuel burning, among other things, and it could be argued that an early and quick response to the acid rain question, to tangible reduction in fossil fuel burning, to reduction of other industrial emissions, and especially to the reduction of N_2O emissions, would have reduced our broader and perhaps more serious problem of global climate change, long-range transport of air pollutants, and resultant toxic air contamination. The emergence of these broader international air pollution questions does not in any way justify our continued failure to act on acid rain and has, in fact, only worsened matters. Technically the climate change–greenhouse warming and other such broad issues are not part of the acid rain debate as a transboundary issue in Canada-U.S. relations because both nations are largely in the same position, as contributors to the problem worldwide and in very significant ways and as recipients of the problem, as are all nations. Furthermore, the scientists of both nations are in the forefront of research in these areas so that Americans and Canadians can be reasonably well informed, if they so choose. Being major instigators, however, it is understandable if they prefer not to be.

What to Do?

If the goal vis-à-vis Canada-U.S. transboundary air quality relations is to contain or resolve the diplomatic aspect of the problem, the task is not too difficult (especially if more emphasis is placed on management and containment rather than on true resolution). Only a balance, a quid pro quo, need be maintained, and good diplomats are well trained to do just that. The Detroit-Windsor, Sarnia–Port Huron air pollution experience points the way to such a balance, as do many other such experiences. But if the goal be true environmental protection

and avoidance of the enormous ecological costs now being imposed upon us, the task is exceedingly difficult and perhaps even impossible in the current framework of conventional wisdom and thought.

In any event, much of the resolution (not all, but much) for acid rain control, for carbon dioxide/greenhouse gas control, for the control of long-range transport of air pollutants lies in much the same area: significant reduction in fossil fuel burning and significant reduction in per capita usage of energy in general, in North America, in Europe, and in other industrialized and industrializing regions. There are ways of achieving such significant reductions, but they are not necessarily politically palatable at this time. Because energy production and use account for almost all of the acid rain problem and most of the long-range air pollution transport problem and play the dominant role in global warming (at 57 percent), policy makers cannot escape the realization that energy production and use must be reduced significantly. This is especially true in such nations as the United States and Canada, which use such great quantities of energy per capita. (The U.S. contribution to global warming is, for example, 21 percent of the global total, a rather astounding figure when one realizes that the U.S. population constitutes only 5 percent of the global total.)

Present U.S. and Canadian air pollution control statutes and policies, it may be concluded, are (1) not sufficient fully to control conventional site-specific transborder air pollution problems of a relatively simple nature, such as at Cornwall Island, because of the lack of emission standards, or at other locales because of the lack of political will to secure enforcement of standards that do exist; (2) not sufficient to achieve any reduction in long-range transport of air pollutants, whether ozone or the precursor gases of acid rain (SO_2 and N_2O), or others, because they simply do not directly address the subject; and (3) totally useless in addressing the emission of CO_2 and other greenhouse gases, accomplishing nothing toward resolution of that problem.

Hence the public policy answer lies in only one area: significant increase in the end-use efficiency of our usage of fossil fuel, which will reduce the amount of fossil fuels we burn and by an equally significant amount. This means, among other things, the need for policies that provide incentive for the use of public surface transportation and, at the same time, disincentive for the use of private transportation; policies that provide incentive for recycling of all products and, at the same time, disincentives for the use of single-use, nonrecyclable products in all walks of life; policies that provide incentive toward labor-intensive production and, at the same time, disincentive toward energy and capital-intensive production; policies that, in general, reduce speed

limits; and policies that improve insulation in buildings, among other measures.

In other words, public policy measures that truly seek to resolve transboundary air pollution problems between the United States and Canada, as well as elsewhere, rather than those that simply seek to contain a diplomatic problem, must now become incorporated into much larger measures designed to encompass a much broader task, one that includes but clearly is not limited to a transboundary air pollution problem between two nations. Policy makers now have no other choice.

Conclusion

We have moved into a new era. Gone are the days of narrow, site-specific transborder air pollution concerns (except, of course, to people immediately afflicted near the border, who justifiably must seek respite from their irritation). Gone are the days of continental acid rain concern, a domain in which we have proven by our actions that we are capable of resolving nothing other than accomplishing the funding to continue research to verify what we already know. And arrived are the days when we are finally beginning to realize and experience the magnitude of this great problem, the challenge of living within the requirements of the global biogeochemical cycle. Arrived are the days when we are finally beginning to discuss action based on our now rather long-held perception of the interconnectedness and interrelationship and interdependency of all things—not just the living but the inorganic or nonliving as well. And arrived are the days when we are finally beginning to be able to perceive and to come to understand the magnitude of the task before us and, as well, the realization that we might not succeed.

It seems a bit pedantic to say that we Canadians, we Americans, we North Americans are all one (as are all others with us). And yet, that is what we are, whether we wish to be or not, and it is the very magnitude of the common problem, and our increasingly common understanding of that problem, and, as well, the challenge of its resolution, that forces us together under one umbrella and brings us to realize that there can be no national solution, only one solution. Otherwise, we all perish. Public policy makers, and indeed all of us, have our work cut out for us. The direction is clear. There is much to be done.

Notes

1. P. C. Mayer-Tasch, "International Environmental Policy as a Challenge to the National State," *AMBIO* 15, no. 4 (1986): 240.

2. Ibid., p. 241. For a further comment on the subject of environmental security, see John E. Carroll, "The Acid Challenge to Security," *Bulletin of the Atomic Scientists* 45, no. 8 (October 1989): 32–34. For commentary on the linkage between environmental degradation and international trade, also a potential national security / national sovereignty issue, see John E. Carroll, "Acid Rain and International Trade," *Ecologist* 19, no. 2 (March–April 1989): 42–43.

3. Lynton K. Caldwell, "Cooperation and Conflict: International Response to Environmental Issues," *Environment* 27, no. 1 (1985): 8.

4. John E. Carroll, *Environmental Diplomacy: An Examination and Prospective of Canadian–United States Transboundary Environmental Relations* (Ann Arbor: University of Michigan Press, 1983).

5. D. H. Dinwoodie, "The Politics of International Pollution Control: The Trail Smelter Case," *International Journal* 27, no. 2 (Spring 1972): 232–33.

6. Carroll, *Environmental Diplomacy*, p. 211.

7. A "reference" is the technical term for a formal directive from government (Canadian or U.S., but usually both) to the IJC to investigate and report on a particular problem, advising government on how best to address it. The reference is usually formally stated, with specific terms and conditions attached.

8. Carroll, *Environmental Diplomacy*, p. 212.

9. International Joint Commission, *Transboundary Air Pollution: Detroit and St. Clair River Areas* (Ottawa and Washington, D.C.: IJC, 1972), p. 1.

10. International Joint Commission, "IJC Issues Air Quality Report for Michigan-Ontario Region" (Ottawa and Washington, D.C.: IJC, 1978).

11. John M. Leddy, Assistant Secretary of State, letter to the International Joint Commission, September 23, 1966, as noted in IJC, *Transboundary Air Pollution*.

12. William Steggles, "Introductory Remarks to a Panel Session: Atikokan—Assessing a New Power Plant," paper presented at the Action Seminar on Acid Precipitation, Toronto, Ontario, November 3, 1979.

13. Carroll, *Environmental Diplomacy*, p. 223.

14. Ibid., p. 228.

15. For a more detailed explanation of the Cornwall Island issue, see Carroll, *Environmental Diplomacy*, pp. 224–27.

16. Grant Mitchell, Secretary to the Cabinet, Government of Saskatchewan, personal interview, Regina, Saskatchewan, November 7, 1980, as reported in Carroll, *Environmental Diplomacy*, p. 234.

17. A Canadian member of parliament, Ralph Goodale of Saskatchewan, wrote in 1978 to U.S. Senator Paul Hatfield of Montana acknowledging the U.S. Senate initiative toward an international air quality treaty and expressing Canadian support.

18. P.L. 95-426, 92 *STAT.* 963, Section 612, October 7, 1978.

19. The Montana legislature passed a joint resolution calling for Canadian-U.S. bilateral negotiation leading to both an air quality treaty and a new IJC-type institution to implement the treaty (HJR 0070).

20. See John E. Carroll, "The Acid Rain Issue in Canadian-American Relations: A Commentary," in Carroll, ed., *International Environmental Diplomacy* (Cambridge, U.K.: Cambridge University Press, 1988), p. 141.

21. Ibid., p. 144.

22. This spring the House and Senate each passed legislation revising the Clean Air Act Amendments of 1977, the first such revisions to pass either house of Congress and the first ever to recognize and address acid rain. It was not possible to predict by press time whether the legislation would be signed into law by the President. The White House supported the Senate's version of the acid rain bill but has criticized some of its provisions as too costly; these may be modified in House-Senate conference.

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