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The Realization of an Issue on the Government Decision Agenda: The Case of Chlorofluorocarbons and Ozone Layer Depletion

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ABSTRACT

The Realization of an Issue on the Government Decision Agenda: The Case of Chlorofluorocarbons and Ozone Layer Depletion

Deborah Alcock

The majority of studies on agenda setting have focused on the process by which issues gain prominence on the formal policy agenda. Only a few have examined the process by which an issue loses salience on the government agenda. Fewer still are afforded the opportunity to examine the evolution of an issue which seems to have followed a cycle of fluctuating importance over its political lifetime. The issue of chlorofluorocarbons (CFCs) and ozone depletion has risen on the federal government policy agenda only to fall and then rise again. Fay Lomax Cook has proposed a model which seeks to explain how issues decline on the policy agenda. This paper examines Cook's models of issue rise and decline within the context of the chlorofluorocarbon and ozone depletion issue. This paper attempts to determine the multiple forces - including scientific evidence, the mass media, public opinion, interest groups and the bureaucracy itself - which helped place the issue on the policy agenda of the Canadian federal government.

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CHAPTER 1

AGENDA SETTING

Focus of the Study

Understanding the process of agenda-setting is becoming increasingly important to understanding the policy making process. Governments are faced with the seemingly impossible task of responding to the many problems and issues which vie for their attention. Clearly, determining which issues receive priority and a place on the policy agenda is a function of a variety of convergent factors.

"Interest in agenda setting per se is not much more than a decade old. It emerges from the great elitism-pluralism debates of the postwar period which focused attention on which people - and which preferences - were to be heard in a democracy and with what results" (Nelson, 1984:20). In their pioneering work, Cobb and Elder (1971), draw attention to the failings of theories which attempt to explain how some issues make it to the policy proposal stage:

> While modern theory directs our attention to the ubiquitous nature of elites and their critical role in the direction of the polity, it fails to specify the points in the system at which the masses may participate in the shaping and determination of major policy issues and the conditions under which they may do so. Consequently, contemporary political science perspectives do not enable political scientists to cope with or explain how at some particular time a previously dormant issue can

> be transformed into a highly salient political controversy when the basis of the grievance has existed for some time: one example is the pollution problem (Cobb & Elder, 1971:900).

Cobb and Elder suggest that to better understand the policy process, greater attention must be given to the agenda setting process, "not how groups gain access to decision makers but rather how issues gain access to an institutional agenda and how groups and institutions play a role in that process" (Cook, 1982:2).

It is the purpose of this paper to examine the multiple forces that have interacted over the last fifteen years to cause the issue of ozone depletion to rise and fall on the Canadian federal government's policy agenda. These forces include the mass media, interest groups, policy communities and public opinion.

Choosing an Agenda Setting Model

Agenda setting has been defined as, "the process by which problems become salient as political issues meriting the attention of the polity" (Cook, 1983:17). Issues on the public or systemic agenda, are those "issues which have achieved a high level of public interest and visibility" (Cobb, Ross, Ross 1976:126). Issues on the institutional, or formal agenda, are defined as the, "set of concrete items scheduled for active and serious consideration by a particular decision making body" (Cobb & Elder, 1971:906). The two may

have a different set of priorities and often the institutional agenda will lag behind the systemic agenda. For the purpose of this paper , attention will be focused on the institutional agenda which is where issues are considered seriously by decision makers.

Cobb, Ross and Ross (1976), propose three models which seek to explain how issues gain access to the institutional or formal agenda. They include the outside initiative model; the inside initiative model; and the mobilization model.

> The outside initiative model accounts for the process through which issues arise in non-governmental groups and are then expanded sufficiently to reach, first, the public agenda and finally, the formal agenda.
>
> The mobilization model, considers issues which are initiated inside government and consequently achieve status almost automatically. Successful implementation of these issues often requires, however, that they be placed on a public agenda as well.
>
> The inside initiative model describes issues which arise within the governmental sphere and whose supporters do not try to expand them to the mass public (Cobb et. al., 1976:127).

The issue of ozone depletion caused by chlorofluorocarbons (CFCs) first emerged as a scientific issue. As such, its progression as an issue seeking agenda status was confined by the relationship between science and government. Generally speaking, science policy can be seen as an example of the inside initiative model of agenda setting:

> To a great extent, the science policy agenda is formulated by this leadership group. The presentation of policy objectives to the decision makers and any subsequent negotiations are conducted by the policy leaders....when there is consensus among policy leaders themselves and between them and decision makers, policy is established without wider public involvement (Miller, 1983:34).

Science issues involve a high degree of technical expertise and therefore have a limited public following (Miller, 1985). Thus, the negotiations which place the issue on the formal agenda are often held behind closed doors.

The rapid expansion of the CFC-ozone issue into an environmental issue (as well as an economic and political issue) meant that the requirements of the inside initiative model were no longer satisfied by the ozone depletion issue. Aspects of the outside initiative model better described the progression of the issue from the scientific arena to the public agenda.

The outside initiative model defines a process whereby issues are defined by a group outside of government (members of the scientific community in this case) and is then expanded first to the public and then the formal policy agenda. In this model, the identification group, expands the issue to attention groups. The members of the identification group are group affiliated while the members of attention groups are issue affiliated. This means that identification groups, such as members of the scientific community, will initially attract the interest of other scientists in the field. They will then

expand the issue to attention groups that might include members of related industries and scientists in other disciplines who express an interest in the issue but who may hold opposing views. Sometimes expansion to attention groups may achieve sufficient attention to achieve formal agenda status. If not, then the issue is brought to the mass public - often via the media.

The mass public may be defined as including a general public and an attentive public. The general public is usually characterized as having limited interest and knowledge in any specific area and therefore their attention for a particular issue is often short lived. If an issue is broadly defined, however, "the involvement of the general public is often crucial in forcing decision makers to place an item on the formal agenda" (Cobb et. al., 1976:129). The attentive public is defined as, "a minority of the population and including those people who are most informed and interested in public issues" (Cobb et. al., 1976:129). The attentive public is not a homogeneous group and therefore they may not be united in their views.

> Thus as an issue expands and attracts more attention and as more members of the attentive public become involved, they are likely to be drawn into both sides of the controversy....they are [also] likely to be among the least persuadable elements of the population once the issue gets defined in a particular manner (Cobb, et. al., 1976:129).

As a rule, science policy is an area of low salience, whereas the broadly defined issue of the environment cyclically attracts high levels of interest. Specific issues such as ozone depletion tend to be introduced to the public within the broader definition of "The Environment" so that they reach a greater number of people.

In order to explain how an issue as complex as the ozone depletion issue reaches institutional agenda status, a model must be adopted which seeks to explain the many forces which bring about the placement of an issue on the agenda. Kingdon (1984) provides a model which takes multiple forces into consideration. Kingdon examines how issues are chosen for the governmental agenda and looks at, "how the alternatives from which decision makers choose are generated, and why some potential issues and some likely alternatives never come to be the focus of serious attention" (Kingdon, 1984:1).

The term 'agenda' is defined by Kingdon as, "the list of subjects or problems to which government officials, and people outside government closely associated with these officials, are paying some serious attention to at any given time" (Kingdon, 1984:3). Kingdon further defines the agenda as, "the government agenda, the list of subjects getting attention, and the decision agenda, or the list of subjects within the governmental agenda which are up for active decision" (Kingdon, 1984:4). Four major concepts of agenda-

building identified by Kingdon are summarized in a review by Levine (1985):

> (1) that a complex model of the coupling of streams of problems, solutions, participants, and choice opportunities is appropriate to understand the dynamics of agendas; (2) that ideas are recombined and incubated over years in "policy communities" of specialists and experts; (3) that "policy entrepreneurs" provide the linkage between an idea whose "time has come" and the decision making structure that must enact the idea; and (4) that the structure of opportunity for an idea to become part of a decision agenda can be thought of as involving the opening and closing of "policy windows" (Levine, 1985:256).

Kingdon also makes an important distinction between alternatives and agendas which becomes relevant when determining at what level parties can influence policy making.

An issue reaches the decision agenda in Kingdon's model when various policy streams come together. Kingdon identifies three major policy streams in the federal government: (1) problem recognition, (2) the formation and redefining of policy proposals, and (3) politics. These streams operate independently of one another. When they do come together at the time of a policy window opening, agenda changes come about.

The political stream is composed of such things as political mood, pressure group campaigns, election results and changes in administration. The policy stream, comprising the various policy communities involved, is differentiated from the political stream by Kingdon in the following manner:

> This community of specialists hums along on its own, independent of such political events as changes in administration and pressure from legislators' constituencies. These specialists are affected by and react to the political events to be sure. But the forces that drive the political stream and the forces that drive the policy stream are quite different; each has a life of its own, independent of the other (Kingdon, 1984:124).

One subject touched upon briefly by Kingdon, but warranting greater attention, is what causes an issue to decline in salience. Two authors who have attempted to explain this are Downs (1972) and Cook (1982). Downs suggests that there is a, "systematic cycle of heightening public interest and then increasing boredom with major issues" (Downs, 1972:38) which he calls the "issues-attention cycle". Downs identified the cycle as comprising five stages. The pre-problem stage prevails when the problem has been identified by some interested parties but not the general public. The second stage is one of "alarmed discovery and euphoric enthusiasm". Usually a significant event brings the problem to the attention of the public who are subsequently caught up in the belief that the problem can and will be solved. The third stage is one of recognition of "the cost of significant progress". The public comes to the realization that to solve the problem would not only involve large commitments of money but might also involve sacrifices such as the discontinued use of certain products. The fourth stage is one of "gradual decline of intense public interest". This

stage comes about as a direct result of the previous stage where demands on the public lead them to ignore or become bored with the problem. The final stage, "the post-problem stage", is one where the problem has been replaced by another and drifts out of the spotlight. The hope is that during the stage of intense attention to the issue, institutions and programs were developed to deal with the problem and that after the issue has drifted out of focus, these processes remain to continue to resolve the problem (Downs, 1972:39-41). Although the issue of ozone depletion may vary slightly from Downs' model, it does seem to have followed the cycle of heightened public interest followed by a decline in interest. The CFC-ozone issue is unique in that the cycle seems to have begun to repeat itself.

Cook (1982) has identified a model which looks, not only at the multiple forces which place an issue on the institutional agenda, but also at how an issue loses salience once on this formal policy agenda. This model is called, the "convergent voice model". In this case, whether an issue gains agenda status or not is dependent on the following:

> [A] 'ripe' issue climate in which the issue is independently and similarily articulated by different groups within and without government at approximately the same time and on legitimization of the issue by means of social science data, media attention, discussion by high officials, and endorsement by appropriate interest groups (Cook, 1982:6).

When these many forces come together, an opportunity comes about for the issue to be placed on the institutional agenda.

Also of great importance to this study is Cook's model of issue decline which examines why an issue loses salience once it is on the institutional agenda. Cook asserts that issues decline in at least two ways. They may be perceived as having been solved or they may simply lose steam.

> This second group includes two kinds of issues: (1) those which emerge onto one or more institutional agendas but never really took off and attracted attention and (2) those which emerged onto several institutional policy agendas and attracted considerable attention (Cook 1982:3).

It is the latter group which concerns Cook.

Issue decline occurs when a major counter voice emerges with additional information about the issue causing the issue to be reformulated. If this makes the issue seem less important and if the following conditions are met, then Cook hypothesizes that the issue will decline. The issue will decline:

> (1) If the involvement of the relevant bureaucratic agencies begin to disintegrate in the face of the revised version of the problem, (2) If a policy community interest in ameliorating the problem loses its cohesiveness or does not develop, and (3) if media attention declines, thus not continuing to inform the public and policy makers about the same issue (Cook, 1982:23-24).

Finally, if the federal agency involved does not give special attention to the issue then it will decline on the legislative agenda.

The agenda status of the ozone issue does not easily fall into any one of Cobb, Ross and Ross' models. The outside initiative model of Cobb, Ross and Ross well defines the progression of the issue over its fifteen year evolution, however, it does not explain the sudden rise to formal agenda status of the issue or the cycle of issue-attention. For this we must turn to Cooks convergent voice model.

Cook's convergent voice model posits that forces from both inside and outside government must converge simultaneously in order for the issue to reach the institutional agenda. Kingdon's model also requires the coupling of streams at a critical juncture to bring about the placement of an issue on the formal agenda but his model neglects to give serious attention to the cyclical rise and decline of the ozone issue on the agenda. Through understanding what causes an issue to dissipate, one can better understand the factors that maintain issues on the agenda. For this, we turn to Cook's model of issue decline and Downs' issues-attention cycle.

CHAPTER 2

CHLOROFLUOROCARBONS AND OZONE DEPLETION

The issue of ozone depletion and CFCs was selected for this study for a number of reasons. First, the process of placing the CFC-ozone issue on the formal agenda has culminated in the formulation of, what many participants in the negotiating process have termed, a precedent-setting treaty - one which responds to an environmental threat in what has been termed a preventive fashion. In this instance, "the diplomatic machinery went into high gear without any hard and formal evidence that substantial damage had occurred, that individuals had become victims etc." (Lang, 1989:4). Policy makers responded, albeit slowly, to scientific evidence that industrial chemicals were suspected of causing depletion of the ozone layer and that this had important health and environmental consequences.

Understanding the process by which this issue was brought to the policy proposal stage should help policy makers to bring other environmental issues to the decision agenda. (See Appendix for chronology of events of issue.) It should also begin to explain why many environmental issues have not been adequately addressed by government. The CFC-ozone issue is

particularly interesting because of its long life course as an issue. Examination of the trends in the cycle of this issue reveal a rise in salience, followed by a sharp decline and then a marked rise in salience over the last three years (1986-1989). With this issue, we can therefore trace not only what forces lead to the decline of the issue, we can also try to explain the forces which have finally placed it on the political decision agenda.

Introduction to the Issue

Chlorofluorocarbons (CFCs) were invented in 1928 as a safe replacement for (toxic) ammonia used in refrigerators.

> CFCs' many desirable qualities (non-toxicity, non-flammability, chemical stability, thermodynamic properties, etc.) made them the number one choice for refrigerants. The 1950's witnessed their introduction as blowing agents in plastic foam products (cushioning, insulating, packaging); the late 1960's, their boom as propellants in aerosol spray cans. CFCs are also used as solvents to clean microchips and other electronic equipment. (Friends of the Earth, 1988b)

CFCs are a stable non-toxic group of chemicals that were considered to be environmentally safe. At the Earth's surface, they are. It is, however, due to their stability at ground level that they are able to gradually rise up into the atmosphere where the chemicals are broken down by the sun's rays and where they then proceed to 'attack' the ozone layer.

> Ozone (O_3) is a pungent-smelling, slightly bluish gas, which is a close cousin to molecular oxygen (O_2). About 90 % of the earth's ozone is located in a natural layer far above the surface of the globe, in a frigid region of the atmosphere known as the stratosphere. Here in this outer region it protects the earth and all its inhabitants from the harmful effects of ultraviolet radiation from the sun (Environment Canada, March 1988)

Research on the ozone layer began in the 1950's. In the 1960's, research on the atmosphere indicated a depletion of the ozone layer. Advances were made as to the cause of this depletion in 1974 when two American scientists working at the University of California at Irvine, F. Sherwood Rowland and Mario Molina, "advanced the hypothesis that the chlorofluorocarbons (CFCs), commonly used for many domestic and industrial uses, rise to the stratosphere and cause a catalytic reaction which destroys ozone" (Tolba, 1987:287). The United Nations Environment Program (UNEP), which had been established in 1972, recognized this threat to the environment and in 1976 the Governing Council of UNEP decided to take action on ozone depletion by establishing committees to examine and coordinate information on the issue.

In 1976, the Government of Canada also took action and announced that it would "order the progressive elimination of CFC-11 and CFC-12, and would prohibit their use in non-essential aerosols" (Tolba, 1987:288). "In 1976, the Canadian industry agreed to cut the use of CFCs in spray cans by half. This was passed in large part due to a consumer boycott. In

1980, Canada banned the major propellant uses - in hairsprays, antiperspirants and deodorants" (Environment Canada, 1988b:4). This reduction was soon offset, however, by increases in other industrial uses for CFCs.

The slow progress in reducing CFCs after 1980 has been attributed to the lack of consensus within the scientific community as to the direct cause and effect relationship between CFCs and ozone depletion. Others have noted that the decline in research and government support in reducing CFC emissions in the United States may be linked with the coming to power of the "anti-regulation" Reagan administration.

In 1981, UNEP began the process of developing a global convention to protect the ozone layer. In March 1985 in Vienna, "21 countries and the 11 EEC countries adopted the Vienna Convention for the Protection of the Ozone Layer, pledging to protect human health and the environment from the effects of ozone depletion" (Friends of the Earth, 1988a)

International attention was dramatically drawn to the issue when British scientists discovered decreasing concentrations of ozone over Antarctica in May 1985. "Scientists had noticed the hole as early as 1978 but did not ring alarms because they had trouble believing their findings" (Friends of the Earth, 1988a).

In September 1987 in Montreal, the Montreal Protocol was signed by 42 countries. In it, "developed nations agree to freeze consumption of the most destructive chlorofluorocarbons

(CFCs) at 1986 levels by 1992, to halve use by 1999, and to freeze production of halons (potent ozone depleters) by 1999" (Friends of the Earth, 1988a)

The final blow to industry was the Report of the Ozone Trends Panel. The Trends Panel brought together the world's leading experts to evaluate scientific data on ozone depletion. They found ozone depletion in the Northern Hemisphere to be double past predictions. "According to the Trends Panel, the earth had already lost more ozone than the EPA predicted would occur under the Montreal Protocol by the year 2075. Instead of a 2 percent loss by 2075....the Trends Panel was reporting 1.7 to 3 percent ozone loss in the Northern Hemisphere in 1988" (Roan, 1989:231). The results of the Ozone Trends Panel finally convinced industry that they could no longer delay action. Du Pont made a dramatic turnabout announcing its decision to end production of ozone depleting CFCs as soon as alternatives were available. With industry support, all involved parties - namely government departments and agencies, the scientific community and interest groups - worked to place the issue on the decision agenda.

CHAPTER 3

APPLICATION OF AGENDA SETTING MODELS

Testing the Convergent Voice Model of Agenda Setting

The number of potential policy issues which compete for government attention are countless. Somehow, policy makers must sift through the many demands made on their time to determine which issues should be given priority. "In the competition, some issues achieve visibility and others do not" (Cook, 1982:4). If one considers the measurement of success in agenda setting as legislating a solution to an issue then we can consider that the CFC-ozone issue reached government agenda status when it was discussed in the House of Commons and by government departments and that it reached the decision agenda when legislation was proposed.

The focus of this study rests primarily with the federal government as it is the federal government which is responsible for controlling toxic substances such as CFCs through the Canadian Environmental Protection Act (1988). It is also at the federal level that Canada is represented in the international negotiations which take place to deal with this global problem.

Actions taken by provincial and municipal governments over the last year came about after the issue had already been placed on the federal government agenda. They served to accelerate the implementation of policy but not its placement on the agenda.

The rise and fall of the issue on the agenda of policy makers is traced by a content analysis of the Debates of the House of Commons 1970-1988. The placement of the issue on this formal agenda is also linked, however, to the agenda of the media and of interest groups. To study these agendas, a content analysis of the two leading multidisciplinary science journals, Science and Nature was conducted as well as content analyses of the Canadian News Index and the New York Times Index. An American paper was used for two reasons. Scientific evidence supporting CFCs' contribution to the depletion of the ozone layer originated in the United States. Secondly, the United States, as a major producer of CFCs, was the centre for lobbying efforts by industry and environmental groups and as a major power its support for control measures was crucial. Finally, the Gallup public opinion polls were reviewed for the years 1970-1988 to trace how often the subject of pollution was addressed. They were also referred to as an indication of public awareness on environmental issues and to determine the existence of a "ripe" issue climate.

The Rise and Fall of the Issue

Canadian concern regarding the CFC-ozone issue was first expressed in the House of Commons in the following motion on November 4, 1974 for the government to study the effect of reon gas on ozone.

> Whereas the threat of the earth's protective layer of ozone arising from the freon gas contained in aerosol cans has become so serious as to be the subject of studies in the scientific journal Nature and to cause others to warn that life on earth will be threatened within 10-15 years if present production of freon gas continues....(Debates, 1974:995).

Since 1974, mention of the CFC-ozone issue in the House of Commons has been rare and sporadic. (See Table 1) The issue was mentioned five times in the year 1974, three times in 1975; seven times in 1976; three times in 1977; once in 1978; four times in 1979 and then the issue remained unmentioned for six years. Ozone depletion emerged once again as a topic in the House of Commons in 1986. In 1987, CFCs and ozone depletion were the topic of the House on four occasions following the signing of the Montreal Protocol and in 1988, the issue finally reached a new level of importance being the focus of debate ten times during the year.

The figures in Table 1 convey a clear indication of a fluctuating cycle of importance. Phase I (1974-1979) reflects a period of heightened interest in the CFC-ozone issue. This is followed by Phase II (1980-1985) when the issue is off the

TABLE 1

MENTION OF THE CFC-OZONE ISSUE IN GOVERNMENT

Year	Debates of the House of Commons	Debates of the Legislative Assembly of Ontario
1970	0	0
1971	0	0
1972	0	0
1973	0	0
1974	5	0
1975	3	0
1976	7	0
1977	3	0
1978	1	0
1979	4	0
1980	0	0
1981	0	0
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	2	0
1987	4	0
1988	10	2

decision agenda and Phase III (1986-present) again reflects an increase in issue salience. The testing of Cook's convergent voice model and her model of issue decline will be applied to each of these three stages.

CHAPTER 4

PHASE I: 1974-1979

In order for Cook's convergent voice model to hold true we should find that the CFC-ozone issue gained agenda status as a result of a number of forces coming together. These include a ripe issue climate and legitimization of the issue by means of social science data, increased media attention, discussion by high officials, and interest group endorsement.

Policy Climate

Cook defines a "ripe issue climate" as occurring when the issue is, "independently and similarly articulated by different groups within and without government at approximately the same time" (Cook, 1982:6). This often occurs when various sub-themes of the issue command attention separately. The issue of ozone depletion caused by CFCs galvanized concerns from a number of areas. It involved concerns about the general state of the environment, health risks, economic concerns and it created a focus for a growing public distrust of big business.

The state of public opinion on environmental issues is also an important indicator of a ripe issue climate. Since

1970, Canadians have been polled regularly on questions regarding the environment. (See Table 2) The same questions have been asked in 1970, 1975, 1977, 1980, 1985, 1987 and 1989. Results to Question 1 reveal that there has been an increasing, although consistently high - ranging from 91-97 percent - level of awareness of pollution dangers among the samples surveyed. This high level of awareness reveals, perhaps, the consensual value of the environment for Canadians. While public concern for the environment in general is strong, it reflects little about the specific case of CFCs. It does reflect, however, the general responsiveness of both politicians and the public to issues of an environmental nature - the issue climate. Public opinion has helped to place the more broadly defined area of the environment on the government agenda.

Public opinion, therefore, is an important indicator for legislators of which issues the public are most concerned with. "Public opinion often provides a cue to legislators concerning which environmental issues possess the public salience and intensity to require attention on the legislative agenda" (Rosenbaum, 1985:64). Increased public concern and expectations regarding environmental issues is viewed as representing "one of the few major shifts in "core values" since the end of the Second World War" (Environment Canada, 1986:4). An important aspect of public policy regarding environmental issues is the argument that environmental

TABLE 2

GALLUP CANADA INC. ON THE ENVIRONMENT
Reproduced from release dated
June 19, 1989

1. **"Have you heard or read anything about the dangers of pollution - that is, contamination of our air, rivers and lakes?"**

Awareness of Pollution Dangers

NATIONAL	Yes, Aware	No, Not Aware
Today	97%	3
1987	96	4
1985	94	7
1980	92	9
1975	93	7
1970	91	9

2. **"How serious do you, yourself, think the dangers of pollution are - very serious, fairly serious or not at all serious?"**

Perceived Seriousness of Pollution Dangers
(Based on Those Aware)

	Serious----------			
NATIONAL	Very	Fairly	Not At All	DK
Today	72%	27%	1%	1%
1987	67	28	1	4
1985	51	37	4	9
1980	52	35	5	10
1975	52	34	5	9
1970	63	25	3	10

TABLE 2
(Continued)

GALLUP CANADA INC. ON THE ENVIRONMENT
Reproduced from release dated
June 19, 1989

3. **"On the whole, would you say that pollution is a problem in your area?"**

Whether or Not Pollution is a Problem in Respondent's Area
(Based on Those Aware)

NATIONAL	Yes	No	DK
Today	67%	30%	3%
1987	54	39	7
1985	46	44	11
1980	46	42	13
1975	53	37	10
1970	56	32	13

protection has become an issue on which there is a general public consensus.

> Perhaps the most significant aspect of public opinion concerning the environment is that environmental protection has become a 'consensual value' in the years since 1970: a broadly and strongly held belief that indicates environmental protection has become part of the nations dominant policy priorities (Rosenbaum, 1985:65).

This statement raises a number of issues. Similar conclusions have been made about public interest regarding the environment within a Canadian context. As the Gallup Poll findings reveal, Canadians have consistently been aware of environmental problems although their concern, as expressed through their perception of the seriousness of environmental dangers, has fluctuated over the years. Question 2 (see Table 2), regarding individuals' perception of the seriousness of pollution dangers, reveals a dramatic increase in concern between 1985 and 1987. Approximately 50 percent of respondents in 1975, 1980 and 1985 considered the dangers of pollution to be very serious. In 1987 that number had risen to 67 percent.

In an essay on "Public Opinion and Environmental Politics in the 1970's and 1980's", Robert Cameron Mitchell distinguishes between, "the strength with which an opinion is held and the issue's salience for the people polled" (Mitchell, 1984:54).

> Strength in public opinion about a social problem refers to the degree to which people regard the issue as a matter of national concern and are committed to improving the situation or solving the problem....polls measure it by asking people to say how seriously or how important they think a problem is, or how concerned they are about the problem.
>
> Salience, in contrast, has to do with how much immediate, personal interest people have in any issue....Mass salience is transitory for all but the most momentous issues such as war or depression (Mitchell, 1984:55).

Salience is being tested when people are asked what are the most important issues. Of the Gallup Polls (1970-1988) asking this question, pollution occurs on a few lists in the early seventies and then fails to reappear. In a study by Dunlap (1987) the author seeks to reconcile, "the strong support for environmental protection reflected in the polls with the evidence (admittedly limited) of the minimal electoral impact of environmental issues" (Dunlap, 1987:36). He gives two explanations: (1) the numerous factors involved in evaluating candidates often pushes their stances on environmental issues aside and, (2) "the near-consensual support given by the public to environmental protection appears to constitute what public opinion analysts term a 'permissive consensus'" (Dunlap, 1987:36).

> In such situations of widespread but not terribly intense public support for a goal, government has considerable flexibility in pursuing the goal and is not carefully monitored by the public (unlike the situation surrounding core economic goals such as low inflation and unemployment rates). It is only when government policy becomes obviously out

> of tune with the public consensus that the government risks political reprisals (Dunlap, 1987:36).

Perhaps, behind the issues attention-cycle defined by Downs there lies another layer of low level attention which remains constant - the consensual value - which Rosenbaum and Dunlap speak of. This constant level of awareness does not necessarily translate into environmental issues being dominant policy priorities, however, nor that being a dominant policy priority ensures a place on the decision agenda.

The consensual value held by the public on environmental matters can be disturbed by major focusing events or by a build-up of disenchantment with government handling of environmental issues. The rise in salience of environmental concerns in the 1970's coincided with important changes such as the "rise of new political issues and narrowly focused interest groups that articulated issues and mobilized the public, and the growing influence of the mass media on the electoral process and on politics more generally" (Vig & Kraft, 1984:34).

The consensual value was also eroded by the changes in public perception of big business. The events of the early 1970's in the United States, including Watergate, Vietnam and the oil crisis, all worked to diminish public trust in institutions. Du Pont found that this distrust was difficult to combat with traditional public relations methods.

> In a series of polls, consumers said they were using fewer aerosol products. Almost half of the respondents said the reason was danger to the environment. But the study's most disturbing findings was the lack of faith in American business ethics. The Du Pont polls found that 29 percent of consumers questioned felt that marketers would put out an unsafe product if it were profitable. Another 35 percent thought "some" marketers would do so. (Roan, 1989:63)

During Phase I, interest in the CFC-ozone theory had spread to a number of communities within and without government. The group which first mobilized interest on the ozone depletion issue was the scientific community.

Legitimization

> In a democracy, government is expected to act as the people's agent. The role of science in this system is to provide a reliable technical basis for some of the decisions government must make on behalf of the electorate. In theory, responsible politicians weigh technical evidence against political, sociological and economic concerns to arrive at answers that benefit most of the people, most of the time. Scientific evidence is not and should not be the only consideration in such decisions, but it is an important component in many cases, especially those involving human health and the environment (Heathcote, 1986:18).

Heathcote's evaluation of the role of science in public policy making agrees with government's perception of the role of science. In a discussion in the House of Commons in May 1988 a similar view was espoused:

> The Minister [of Environment] has told American decision makers that scientific information can only

> assist in public policy making. Science cannot and should not be the sole determinant of public policy. To think so is to put scientific investigation in a role for which it is neither designed nor equipped to do (Debates, 1988:13979).

The role of science in public policy making is confined by this relationship. Policy makers are dependent on scientists for the technical information on which they sometimes base their decisions. But, scientific discovery is frought with uncertainty. This was particularly true of the CFC-ozone issue. The international scientific community has been the driving force behind bringing the CFC-ozone issue to the attention of federal policy-makers. In the early 1970's concern was expressed about the threat from gases called nitrogen oxides that were released in the exhaust of high-flying supersonic jets (SSTs). Scientists suggested that these gases could cause ozone depletion. With the findings of Sherry Rowland and Mario Molina in 1974, concern about SSTs was soon replaced by the CFC-ozone theory. When research first began to discover the link between CFCs and ozone depletion little was understood about the chemistry of the atmosphere. Scientists such as Rowland and Molina were demanding support for controls of CFCs without scientific consensus on the cause of ozone depletion.

> Those pleading in favor of restrictions and control measures had to rely on extrapolations, on assumptions, on models; at first, they had to convince governments that chlorofluorocarbons were

> detrimental to the ozone layer; secondly they had to convince the same governments that a depletion of the ozone layer would cause damage to the environment and to human health as a consequence of increased UV-radiation; thirdly they had to persuade everybody that substitute substances were available or could easily be made available (Lang, 1989:5).

To track the progression of the issue within the scientific community, a content analysis of the respected scientific journals Nature and Science was conducted. The journal Nature is a British journal and Science an American journal. Table 3 illustrates the number of articles on the CFC-ozone theory published in these journals for the years 1970 to 1988. Articles related to the CFC-ozone theory issue first appeared in the journals in 1974. Between 1974 and 1979, the number of articles in the journal Nature remained fairly constant, between 3 and 5 per annum with the exception of 1976 when there were 9 related articles. In 1980 the number dropped to 2 articles but shot up to 6 articles in both 1981 and 1982. In the years 1983 and 1984, the number of articles declined to 2 and 3. The number of articles began to rise in 1985, although slowly, with 5 that year. The following three years showed a significant increase in the number of articles - peaking at 27 in 1988. For the most part, the journal Science showed the same rise and decline in articles published on the subject, although, Science carried fewer articles on the issue. The same decline for the years

TABLE 3

ARTICLES ON THE CFC-OZONE ISSUE IN SCIENTIFIC JOURNALS

Year	Science	Nature
1970	0	0
1971	0	0
1972	0	0
1973	0	0
1974	2	3
1975	3	4
1976	1	9
1977	0	3
1978	3	5
1979	0	5
1980	1	2
1981	2	6
1982	1	6
1983	0	2
1984	4	3
1985	0	5
1986	4	10
1987	6	9
1988	12	27

1979 to 1983 is demonstrated as is the significant increase in articles for the years 1986 to 1988. It is clear that the CFC-ozone issue has, for the most part, been a constant concern for scientists over the last eighteen years and that its importance has reached an all time high over the last three years.

Discussion by High Officials/Interest Groups

Scientific evidence was a key factor in bringing about the ban on non-essential aerosols but it certainly was not the only force in action. By 1974, there was a grass-roots push in the United States for hearings on the CFC-ozone theory coming from the municipal and state level. "In Ann Arbor, Michigan....the city council voted to urge citizens to follow a voluntary ban on the use of aerosol sprays containing CFCs" (Roan, 1989:30). The Congressman representing the district and also a member of the U.S. House Committee on Public Health and Environment, requested that hearings on the CFC-ozone problem be convened. This grass-roots action led to the first federal hearings on the issue as well as galvanizing the nation's environmentalists (Roan, 1989:30). One of these was the National Resources Defense Council (NRDC), a group which remained an active force throughout the long struggle to control CFCs. While the issue was gathering some public attention, policy makers waited for scientific proof of a problem. They were dealing with a major industry whose

decline would have significant economic impacts. The issue reached the federal policy agenda in the United States in 1975 with the creation of the presidential task force, the Committee on the Inadvertent Modification of the Stratosphere (IMOS). The committee, faced with problems of jurisdiction and conflicting scientific statements, deferred to the National Academy of Sciences (NAS).

Roan (1989) claims that the CFC issue was also used as a vehicle for members of Congress to bring about additional regulatory framework for addressing environmental matters. By the Fall of 1974, "16 bills had been introduced in Congress that could affect aerosol production" (Roan, 1989:44). This overloading of Congress combined with the federal government's desire for more scientific proof of the validity of the CFC-ozone issue slowed federal action on the matter considerably. State governments, however, were picking up the pace. "By the spring of 1975, eleven states had legislative proposals regarding CFC regulations, and the battle between the chemical industry and proregulation forces moved into the state houses of Oregon, New York and California" (Roan, 1989:47). The continuation of hearings at the state level provided scientists, environmental groups and industry the forum to continue their debate. Oregon became the first state to ban the sale of CFCs in aerosols and industry feared that state legislation could bring about national legislation. In Canada this type of action by a provincial government occurred much

later when in January 1989 the province of Ontario banned CFCs. According to a senior official at Environment Canada, this action was very much a case of provincial grandstanding. The announcement did appear, however, to 'embarrass' the federal government into accelerating its ban on the use of CFCs and was seen as a clear indication of provincial support for such a ban.

In 1976, the National Academy of Science (NAS), the organization charged with studying the validity of the CFC-ozone theory, released a report regarding Rowland and Molina's theory. The NAS, "under the burden of having to decide on the economic fate of one of the nation's biggest industries," (Roan, 1989:80) hesitated to provide immediate support for a ban. It recommended instead, that government action on regulation be postponed until further evidence was gathered. The report did verify the CFC-ozone theory, however, and the following month the Food and Drug Administration (FDA) and the EPA proposed a ban on non-essential uses of CFCs, effective in 1978.

In Canada, a similarily ambiguous report was tabled. The Report of the Atmospheric Environment Service Advisory Committee on Stratospheric Pollution, dealing with the effect of chlorofluorocarbons on the ozone layer was tabled in the House of Commons in 1976.

> The report concludes that "the scientific evidence is sufficiently strong to warrant the government

> making a decision on regulation of chlorofluorocarbons," and that "if scientific evidence were the only consideration, the committee would recommend regulations to achieve a significant reduction in fluorocarbon release rates" (Debates, June 13, 1977:6586).

Regulations did come about, but the delays involved hint that considerations other than scientific evidence were more important.

Media Attention

The media's role is primarily that of affecting public opinion. The print media was selected for this study because it is able, where television and radio are not, to devote more time to a subject and to provide greater detail in its reports.

> The mass media seem to report events more than influence governmental agendas. But media's indirect impacts include affecting public opinion, which affects politicians, and magnifying events rather than originating them. Specialized media, followed by those particularly involved in a given policy area, serve to communicate within policy communities, and thus have more impact on agendas and alternatives than mass media (Kingdon, 1984:71-72).

By magnifying events, however, media helps to activate the consensual support for environmental action to a matter for attention. The news media is also a major vehicle of public education, one that has been used most effectively by environmental groups.

Three media indexes were used as indicators of issue importance. (See Table 4) A content analysis of the New York Times (NYT) for articles relating to the CFC-ozone issue was conducted for the years 1970-1988. During the years corresponding to Phase I of the CFC-ozone issue, the NYT showed a burst of articles on the issue particularly for the years 1975-1977. Although the paper was still carrying many more articles than Canadian papers, the number of articles in 1976 dropped approximately 30 percent from the 1975 level, and the same again in 1977. By 1978, articles on the issue were in a definite decline until Phase III when the issue regained popularity.

The Canadian News Index (CNI) is indexed from 1977 onward. It carried no articles on the subject until 1985 when it carried five articles. This number jumped dramatically up to 17 in 1986, 76 articles in 1987 and 67 in 1988. To accommodate for the lack of data between 1970-1977 the Canadian Periodical Index was also referred to.

Looking to the Canadian Periodical Index, one sees a similar pattern of issue (in-)attention. Prior to 1975, ozone was not a topic in Canadian periodicals. Between 1975 and 1977, one to two articles are listed that deal with the banning of aerosol sprays using CFCs but by 1979 to 1985 that number dropped to zero. There was one article in 1986 in Equinox, then suddenly in 1987 the number of articles jumped to ten. Most of the ten articles dealt with the 'mysterious'

TABLE 4

ARTICLES ON THE CFC-OZONE ISSUE IN PRINT NEWS MEDIA

Year	NYT	CNI	CPI
1970	0	-	0
1971	0	-	0
1972	0	-	0
1973	0	-	0
1974	7	-	0
1975	29	-	1
1976	20	-	1
1977	13	0	2
1978	7	0	1
1979	5	0	0
1980	6	0	0
1981	3	0	0
1982	2	0	0
1983	2	0	0
1984	1	0	0
1985	1	5	0
1986	9	17	1
1987	21	76	10
1988	23	67	28

NYT = New York Times
CNI = Canadian News Index (Index 1977-)
CPI = Canadian Periodical Index

threat of ozone and the ozone hole. In 1988 the number of articles had jumped again to thirty and the tone had changed from one of doom to one demanding action to protect the ozone layer.

The indexes show strong media attention for the years 1975 to 1977. Attention peaked in the New York Times in 1975 but began its decline in the following year. The Canadian Periodical Index carried articles on the CFC-ozone theory between 1975 and 1978. The decline in articles which began in 1977, indicate, perhaps, a lag in Canadian media attention for the issue compared to American print media.

Conclusions Regarding the Convergent Voice Model

Phase I in the CFC-ozone issue meets some of Cook's criteria for issue salience but it is weak in others. The policy climate in terms of support for legislation of controls on CFCs is very strong during this period. In the United States, support for a ban was being voiced by state legislatures, by a public showing its support through a boycott of aerosol products and by environmental groups such as the NRDC. Within government, the issue was of concern to the EPA, the FDA and to the Consumer Product Safety Commission. Legitimization through scientific data was not fully available, however, because of the lack of scientific consensus on the cause of ozone depletion or even of its existence.

In Canada, discussion by high officials was primarily in response to policy actions in the United States. Senior officials at Environment Canada see their involvement in the issue as only beginning seriously in the 1980's. The rationale for the Government of Canada's ban of the use of CFCs in non-essential aerosols in 1980 may be explained, therefore, as a response to the American experience and as a result of the forces generated by the attention cycle of the issue.

The following represents a possible scenario of Phase I in terms of Down's issues-attention cycle: A public concerned with environmental issues is informed of a possible threat to the atmosphere caused by chemicals used in aerosol propellants. The issue receives a great deal of media attention, magnifying its importance as a public agenda item but not reflecting its limited impact on the decision agenda. This public concern causes a boycott of aerosol products which forces government to appear to take action. At that time, "the crucial question for the industry....[was] whether or not consumer reaction will be ahead of government action" (Roan, 1989:58).

> American consumers were wiser than they were sometimes given credit for. The CFC-ozone theory generated more letters to the federal government than any issue since the Vietnam War. Polls showed American consumers were well aware of the controversy. One survey showed that 73.5 percent of the respondents had heard something about it. Of those people, about half knew it involved the

> ozone layer. Almost half said they had stopped using aerosol products because of the threat (Roan, 1989:58).

Worried producers of the product voluntarily begin reducing the use of CFCs as propellants. Once the legislation is passed, however, the issue begins to lose steam.

It would appear that this stage in the CFC-ozone issue cycle can be best explained by Down's issue attention cycle. The problem is identified by a group other than the general public, namely scientists. The alarmed discovery and euphoric enthusiasm stage brings about a boycott as people are convinced they can solve the problem. The gradual decline in the issue may be less a function of the realization of the cost of solving the problem as a feeling by the public that they have taken sufficient steps to solve the problem. In some ways, the aerosol ban was a significant step. Unfortunately it diffused concern over the issue and initiated a search for alternate uses for CFCs that ultimately increased their production and use. "In the 1970's, consumers could protest use of the chemicals by refusing to buy deodorants, hair sprays, and cleaners containing CFC propellants. But in 1986, CFCs were much more deeply ingrained in American consumerism" (Roan, 1989:144). CFCs have become a part of everyday life. The chemicals are used in refrigeration, in air-conditioning, to package foods and as solvents for

cleaning computer parts. Eliminating CFCs in the 1980's is a much more difficult process.

Phase I reflects therefore, the issue reaching the public agenda but it only reached the Canadian decision agenda for a brief moment as a reaction to American legislation and public pressure.

CHAPTER 5

PHASE II: 1980-1985

Looking to our indicators of issue attention, we find that the issue of CFCs and ozone depletion declined on the government agenda during the years 1980-1985. Evidence of this decline includes the lack of discussion of the issue in Parliament and in periodicals such as the New York Times, and Canadian newspapers as well as a decline in coverage by the major scientific journals. According to Cook, "for an issue to lose salience, that is already on an institutional agenda, is universally supported there, and offers symbolic political advantages, some strong element must be present that convincingly defines the issue differently from the previously accepted way" (Cook, 1982:10). Although the CFC-ozone issue was not universally supported it did offer significant symbolic advantages - rarely does acting on an environmental matter bring anything but positive public reaction.

The Counter-voice

Cook's model of issue decline seeks to redress the limited role that has been attributed to social science research in agenda setting. Cook claims that "common

consensus holds social science research information to be relatively unimportant in the policy process" (Cook, 1982:10). Quoting Lindblom and Cohen (1979:52-53), Cook writes:

> They contend that social science information "will become authoritative if it confirms ordinary knowledge and often not if it contradicts it. And, as is familiar, it will become authoritative in some users' minds if it squares with their ideology or conforms to their general world view or epistemological position but not otherwise" (Cook, 1982:10).

Cook argues that this is changing. "Social science information cannot be seen by itself as an input into the policy process but must rather be seen within a system of information as well as information users" (Cook, 1982:10). This description paints an accurate picture of how scientific information was perceived in the CFC-ozone issue. Policy makers, usually attentive to scientific evidence as an input in the decision making process, allowed other factors to outweigh the possibly devastating environmental impact of ozone layer depletion. Unfortunately, empirical evidence of ozone layer depletion and its effects were not available during the first ten years of the debate. As a result, the magnitude and nature of the problem could not be convincingly portrayed.

The policy momentum which the aerosol ban initiated quickly dissipated. Cook states that policy momentum can be dissolved through problem reformulation caused by the

emergence of a major counter voice. "This voice might be social science data or a well organized articulate opposition group" (Cook, 1982:23). The major counter voice which triggered the decline in attention to the issue of CFCs and ozone depletion was the discovery by Rowland and Molina, of a possible problem with their CFC-ozone theory. Throughout 1975 and 1976, Rowland and Molina searched for other chemical reactions which might offset the CFC-ozone reaction they had identified. In spring 1976, they discovered that they had miscalculated the lifetime of the chemical, chlorine nitrate.

> This finding threw a huge new loop into the theory. The presence of chlorine nitrate, Rowland and Molina knew, would make a difference in the chain reaction. Chlorine oxide, formed when chlorine is released from fluorocarbons, might link with nitrogen oxides in the atmosphere to produce chlorine nitrate. By tying up chlorine, less ozone would be destroyed than the 7 to 14 percent Rowland and Molina had suggested (Roan, 1989:73).

The news became public immediately. The normally "private" process of scientific discovery was being closely monitored by industry, government and environmentalists. Industry was delighted with the information and celebrated it with headlines professing the end of the aerosol scare. Policy makers were stunned by the news.

> To many people, legislators and scientists alike, however, the very fact that it had been Rowland and Molina who had come forward with the new information somehow enhanced the credibility of the entire issue. While some critics had contended that Rowland had made up his mind that the CFC-ozone

> theory was correct, it was now apparent that he was still working, along with others, to learn more about stratospheric chemistry and that he would contribute to the downswings as well as the upswings in depletion estimates (Roan, 1989:79).

This episode best reveals the lack of understanding policy makers have of the scientific process. Whereas scientists are continually questioning and testing theories as a normal part of the scientific process, policy makers interpret this as confusion. A legislative assistant involved in the Environmental Committee [U.S.] hearings of 1975-1976 made the following comment. "It was interesting to me as a scientist to hear (industry representatives) refer to it [the CFC-ozone theory] as 'the theory'. To a scientist, a theory is sort of the pinnacle of intellectual accomplishment. To industry, theory meant nothing more than your speculation versus my speculation" (Roan, 1989:45).

Unfortunately, many policy makers were also of this opinion. Although, as we have seen from Phase I, legislation was introduced to ban the use of CFCs in non-essential aerosols, the chlorine nitrate episode only served to heighten the effects of scientific uncertainty on policy makers. Efforts to further control CFCs would not come about until ten years later.

Characteristics of Issue Decline

Cook also identifies three conditions which are characteristic of issue decline and which act in unity with a counter voice. They include decline in attention of the relevant bureaucratic agencies, a policy community loses it cohesiveness or fails to develop and media attention declines.

It is difficult to track the decline of bureaucratic attention within the Canadian bureaucracy because the issue was still very much confined to the American arena. Hearings such as those held in the United States were not reproduced here in Canada and senior officials within Environment Canada see their involvement as commencing in the early 1980's. In the United States, however, a decline in bureaucratic attention did occur caused in large part by the new administration's anti-regulation policies.

> By the time EPA officials got around to addressing regulations for all CFCs, in the late 1970's, the climate toward regulations was weakening. And, by late 1980, the new Reagan administration moved into Washington, favoring limited government involvement in environmental matters. The administration emphasized that ozone depletion was a global problem requiring international attention (Roan, 1989:87-88).

The major reason for the decline of the issue on the agenda, however, was the lack of consensus within the scientific community. Policy makers relied on the legitimization of scientific data to support calls for legislation of CFCs. Without scientific proof that CFCs were

causing ozone depletion or that such reductions in ozone would have a direct effect on humans, a policy community in support of legislation failed to develop. Add to this the changing administration in the United States and the need for global action to make any regulations effective and the issue lost momentum. The issue was losing steam even within environmental groups such as the NRDC where resources were being diverted to other problems. In Canada, environmental campaigns on ozone did not come about until 1987.

While the issue dropped from sight on more popular agendas such as that of the news media, it had in fact reached the international agenda and moved behind the closed doors of international consultation. The issue may also have been kept alive by relatively consistent attention to the issue from scientific journals. (Nelson,1984:25) The issue was declared a priority agenda item by the United Nations Environment Programme (UNEP) in 1980 and the bureaucratic machinery in Canada, set in motion by its ban on non-essential aerosols, began to investigate the issue. Since most of the negotiations regarding the development of Canada's position on the CFC-ozone issue seem to have been conducted in a "behind-the-scenes" fashion between industry and the bureaucracy, it is of interest to establish if there is a relationship between examples of Canada's leadership role on the issue and treatment by the media and Parliament. According to the background information which accompanied

Environment Minister Lucien Bouchard's February 20, 1989 announcement that Canada would completely phase out the use of controlled CFCs within the next ten years, Canada has enjoyed a leadership role in bringing about the control of CFCs. Environment Canada lists a number of important contributions that Canada has made in the process. In May 1980, Canada announced regulatory measures to protect the ozone layer by banning non-essential uses of CFCs in aerosols. In November 1981, Canada supported a call for a global convention on the use of CFCs and in September 1984, Canada hosted an informal meeting to develop draft control measures that would form an integral part of a global agreement on the ozone layer. In March 1985, the Vienna Convention was signed. Canada was the first country to ratify that convention in June 1986. In September 1986, Canada proposed an innovative approach to developing global controls that broke the deadlock at an UNEP workshop in Leesburg, USA, paving the way for global consensus. A year later, in September 1987, Canada hosted the diplomatic conference that finalized the Montreal Protocol. It is interesting that the years between 1980 and 1986, crucial years with respect to the formulation of the international treaty, were characterized by years of quiet negotiation, a decline in attention by the media and little support from environmental groups.

Conclusions Regarding Cook's Model of Issue Decline

For Cook's model to apply one must identify a major counter voice that emerges with additional information to cause the issue to decline. The counter-voice throughout the CFC-ozone issue was conflicting scientific data which was used to the advantage of both industry and government.

> In 1981, the Chemical Manufacturers Association, of which Du Pont is a prominent member, released figures showing that the ozone component of the stratosphere had actually increased, and in 1984 it triumphantly circulated the results of further studies that found no discernible trend one way or another (Lees, 1988:6).

At the same time, science was finding very little to support government legislation.

> Science had little to offer policy makers trying to resolve the issue. It sometimes seemed that reaching a consensus on the extent of ozone depletion would be impossible. Two additional reports from the National Academy of Sciences - in 1982 and 1984 - showed that the stratosphere was still an area of vast unknowns (Roan, 1989:109).

As we have already mentioned, during the years 1974-1979 the issue was focused on the use of CFCs as propellants in aerosols. The ban on these products forced the CFC industry to search elsewhere for uses of its product. These additional uses further entrenched CFCs into the everyday lives of North Americans thereby strengthening the position of industry. This was supported by a number of other developments. In April 1980, the EPA announced its intent to freeze CFC

production at 1979 levels. Industry's response was to form the Alliance for Responsible CFC Policy, "a trade group charged with lobbying against additional regulations" (Roan, 1989:103). This provided industry with a strong voice and government with an identifiable and united negotiating partner.

> CFC manufacturers, united by the 400-member Alliance for Responsible CFC Policy, took to the Hill to lobby for legislation that would further halt CFC restrictions. Industry pushed for legislation that, on its face, appeared to provide for CFC regulations but actually precluded any U.S. regulation until there were actual measurements of ozone depletion directly attributable to CFCs or there was an international agreement (Roan, 1989:108).

On the other hand, the scientific community could not offer the unified consensus opinion that government needed to legitimize taking further action. The coming to power of a new administration - one committed to anti-regulation policies - further delayed action to stop ozone depletion. Finally, the issue had moved on to the international agenda of the United Nations Environment Programme.

CHAPTER 6

PHASE III: 1986-1989

Ripe Issue Climate

The counter voice of scientific uncertainty upon which industry relied was effectively destroyed by the discovery of the ozone hole in October 1984. "The greater the apparent threat from visible forms of air pollution and the more vividly this can be dramatized, the more public support environmental improvement will receive and the longer it will sustain public interest" (Downs, 1972:46). This was indeed true of the discovery in 1984-1985 of dramatic reductions in ozone over Antarctica during the austral spring. Scientific consensus began to develop in 1985 when the discovery of the ozone hole accelerated research on the link between chemicals such as CFCs and ozone layer depletion. This consensus was also strengthened by the years of accumulated knowledge that the CFC-ozone issue had initiated. The discovery of the ozone hole grabbed the attention of the media and the public and legislators were bombarded with news about the threat of CFCs.

> The idea that the ozone hole, like a tiny puncture in a fragile eggshell, could signal the eventual demise of the earth's atmosphere, shook many policy makers into action by early 1986 (Roan, 1989:142).

Its discovery shook the CFC industry into action and provided the legitimization that policy makers had been waiting for.

The discovery of the ozone hole, and the ground-breaking research which followed, moved industry to reconsider its stand on the CFC-ozone theory. This period marked the first time in the history of the CFC-ozone issue that representatives of industry agreed with the goal to place restrictions on the production of CFCs. They would continue to disagree on the details of these measures' implementation but for once, action was being supported by the major participants both inside and outside government.

In addition to industry support, the issue of CFCs and ozone depletion was a priority issue for international organizations. The United Nations Environment Programme had just achieved significant success with the signing of the Vienna Convention (1985). Organizations such as the International Council of Scientific Unions launched its International Geosphere-Biosphere Programme (IGBP) in 1986. In Canada, the Royal Society of Canada was charged with formulating the Canadian response to the IGBP in the form of the Canadian Global Change Program (CGCP). Even as efforts were underway to protect the ozone layer, the issue was taking on new dimensions.

Ripe Issue Climate: Industry Dictated?

The scientific uncertainty and long wait for evidence of harm from reduced levels of ozone meant that, "international negotiators clearly relied on values other than science to balance the risks and benefits of regulating chlorofluorocarbons" (Roan, 1989:102). Evidence points to industry as dictating the values on which decision makers based their decisions.

Industries, particularly those involved in highly technical areas such as the manufacturing of chemicals, hold a great deal of influence when it comes to legislation and the interpretation of industry-related laws. Business interest groups often play a valuable role through the provision, "of technical information on how firms will be affected by government programs and feedback on industry reaction to policy alternatives, aside from the advantages of negotiating with organized constituencies" (Litvak, 1983:132). In Canada, traditional business-government relations have been structured by a political system which favours elite accommodation.

> For business government relations this has meant that business interests have focused their attention on attempting to influence cabinet and the civil service through quiet diplomatic methods. Business as a "legitimate" interest group has access to the influential and therefore consults with governments in an attempt to reach accommodation (Litvak, 1983:130).

Although this system has been opened up by the growing number of interest groups attempting to influence government and public opinion, industry often participates at a much earlier stage in the agenda building process than other groups. This is because industry possesses the expertise that the bureaucracy relies on in the formulation of policy.

The CFC industry had the advantage of providing policy makers with a clear set of demands. Although it might seem unfair, considering the implications of ozone depletion, the onus was on scientists to prove that CFCs caused ozone depletion rather than it being the industry's responsibility to prove that they did not. This is a problem that is well entrenched in environmental hazard's legislation. (Schrecker, 1984)

> In Canada, government and industry often hav an extremely close relationship, wedded by common objectives, common attitudes, and more concrete ties such as government loans, grants and subsidies. Governments are hungry for revenue and employment - generating projects: In this broader context of government-industry partnerships, environmental protection may not receive the protection it should. Environment is usually considered a junior portfolio in Cabinet; in times of government spending cutbacks, environmental programmes are often the first to hit the chopping block (Webb, 1987:10).

Schrecker (1985) claims that the government-industry relationship goes beyond this mutual accommodation when governments are dealing with megacorporations.

> Megacorporations tend, individually and collectively, to shape the overall economic context and agenda of government policy into which environmental protection must fit, to a greater or lesser extent. Thus looking only at specific conflicts over environmental issues between megacorporations and government agencies inevitably understates the extent to which corporate priorities have shaped public policy (Schrecker, 1985:10).

Critics of the corporate role in public policy are supported in their view by the following statement made by the Vice-President of E.I. Du Pont de Nemours Co. in 1989, "Governments must tailor their policies to suit the chemical industry or the search for new chemicals will be delayed or stopped altogether." (Globe & Mail, March 6, 1989:A-5) Corporate "strong-arm" tactics such as this were felt throughout the CFC-ozone debate.

Lees (1988) makes the following observations about the interaction of government and industry in terms of the CFC-ozone case.

> The response of government agencies and industries to environmental concerns has always been one of calculated minimalism, a grudging half-hearted reaction to public outcries, an exercise written off to the exigencies of public relations. But unlike other more conventional pollutants, CFCs never produced bad odors, dead fish or sick pets to sound a warning or attract the photographers; nor have there been any neighbours to complain about the problem in the stratosphere. This meant that these same agencies have been largely left alone to sift the data provided by observatories and satellites, and to grapple with the issue virtually free of public pressure" (Lees, 1988:6).

It is clear that without the discovery of the ozone hole, industry and government would still be waiting for concrete proof that the ozone layer is threatened. Only when industry acknowledged the threat of CFCs, (or had discovered alternatives) did international negotiations get finalized.

In the Fall of 1986, Du Pont announced it was willing to reconsider its stand on CFCs. "In October, Du Pont in the United States issued a call to the EPA to work out a unified American position among CFC users, manufacturers, environmentalists and federal agencies to take into international negotiations" (Lees, 1988:9). Lees suggested that Du Pont's statement, "provided the go ahead signal that American policy makers had been awaiting" (Lees, 1988:9). It was not long after that American officials began negotiations for cuts in CFC production.

Scientific evidence was used both to advocate legislation as well as to counter it. Whereas federal policy-making seems to have been driven by scientific evidence, industry sought to manipulate scientific evidence to support its claims. Lees quotes Rowland as saying that, "the number of people in the atmospheric sciences community who haven't received money from the chemical industry for their research is very small" (Lees, 1988:6). Rowland intimated that scientists accepting this monetary support were more likely to emphasize those things which cast doubt on his findings.

In concluding this section, it seems clear that industry's role in creating a ripe climate issue cannot be ignored. Policy makers' tendency to weight industry concerns more heavily than environmental ones was evident throughout the evolution of the CFC-ozone issue. Finally, the announcement by the leadership of Du Pont of its support for a ban on CFC production certainly accelerated the issues move onto the government's decision agenda.

Discussion by High Officials

Evidence of Canadian senior officials' involvement in placing the CFC-ozone issue on the government decision agenda is derived from the examples of Canada's leadership role in bringing about global negotiations on the issue. (For a discussion of these accomplishments, refer to Phase II). These discussions were primarily directed through the United Nations Environmental Programme.

> UNEP was involved in the entire process - from the earliest preliminary and exploratory meetings to the final words of the Montreal protocol. This was, I believe, a classic example of UNEP applying its catalytic mandate and a classic example of the positive contribution of science to political action (Tolba, 1987, 287).

The United Nations Environment Programme (UNEP) was "established by the United Nations two years previously [in 1972] with a mandate to catalyse and coordinate actions to protect the environment (Tolba, 1987:287). In 1976, UNEP was

directed to look into the possible threat of CFCs on the ozone layer.

> Early in 1977, UNEP convened a meeting of experts which adopted a 21 points World Plan of Action on the Ozone Layer and gave UNEP the role and responsibility of collating, disseminating and encouraging pertinent research. A Coordinating Committee on the Ozone Layer was established by UNEP to assist it in coordinating the increasing international research programme and information on the issue, and the carrying out of regular assessments of ozone-layer modification and its impacts based on the research results (Tolba, 1987:287).

It was the leadership of UNEP and its executive director Dr. Mostofa Tolba that kept the CFC-ozone issue a going concern even during the years of declined issue attention. It was primarily though involvement with UNEP that Canadian discussion of the CFC-ozone issue progressed.

By 1986, however, discussion, both domestically and internationally, was reaching beyond the issue of CFCs and ozone depletion. It is difficult to determine whether the topic of global change evolved out of the opportunity of the CFC-ozone issue or if the CFC-ozone issue was simply a manageable policy alternative on the broader global change agenda.

Media Attention

The third legitimizing factor which causes the rise of an issue on the formal agenda is increased media attention.

This was certainly a force in bringing the CFC-ozone issue to the decision agenda in Canada. The greatest environmental awakening seems to have occurred in Canadian newspapers. With no mention of the issue until 1985, Canadian papers carried 17 stories on the issue in 1986; 76 articles in 1987; and 67 articles in 1988. The CPI carried 1 story in 1986; 10 in 1987 and; 28 in 1988. (See Table 4). This strong show of media attention supports Cook's convergent voice model.

Interest Group Endorsement

Politicians lend a great deal of importance to public opinion polls and they are particularly important to policy makers as they help to identify the collective consensus on issues. It was under this permissive consensus that the government of Canada was acting as it participated in international negotiations to control the use of CFCs. When the issue was brought to the public's attention through such events as the ozone hole and through the actions of environmental groups and the media, public concern demanded that the federal government take visible action.

One indication of the public's support for environmental issues is the opinion poll. Perhaps a stronger, more direct indication of support is the number of people paying membership dues to environmental organizations (Dunlap, 1987:35). Environmental organizations are important factors in the agenda building process. They serve to educate the

public, lobby government through their support of the bureaucracy and through direct lobbying of members of Parliament. Like the media, they also serve to draw attention to, and magnify the importance of an issue. In Canada, the environmental group Friends of the Earth campaigns vigorously on the CFC ozone depletion issue. The group's campaign on ozone depletion began, however, only two years ago, in 1987. The ozone campaign came about as a result of organizational restructuring as well as the policy entrepreneurship of the organization's new executive director. The organization capitalized on an eager public and an important issue on which to focus its attention. Membership in the organization grew from the steady support of about 2000 prior to 1987 to 15,000 in October, 1989 due to the groups "Ozone Campaign".

Friends of the Earth's involvement in the CFC-ozone issue was the result of demands for information from a segment of the public as well as prompting from Environment Canada officials that the issue was one that should be brought to the attention of the public.

> As for political will, we look toward responsible environmental groups and journals such as the European Environment review to prod the public conscience and thereby create the necessary 'political will'. It is, however, becoming increasingly difficult for anyone at the political level to refuse to acknowledge the inseparable linkage between a healthy environment and a sustainable economy (Buxton, 1988:47).

Friends of the Earth's involvement in the CFC-ozone issue began after the issue had reached the government agenda. Environment Canada, "has provided financial support to Friends of the Earth, a national environmental organization, to develop a program to further sensitize the consumer to the ozone-depletion issue and to the types of products that contain CFCs and halons" (Environment Canada, 1988:3). The group was essential in getting the issue from the government agenda to the decision agenda where the decision was made to legislate the ban of CFCs in Canada.

Convergent Voice and Phase III

Monitoring the scientific data on the CFC-ozone theory provided many hints that a problem existed with respect to depletion of the ozone layer. Often, however, indicators are not enough to get the attention of policy makers. This was especially true in the case of the CFC-ozone theory issue which included much conflicting and confusing scientific evidence. Often what is required is a focusing event to call attention to the problem.

"Sometimes crises come along that simply bowl over everything standing in the way of prominence on the agenda" (Kingdon, 1984:101). The crisis that made way for the CFC-ozone issue on the decision agenda was the discovery of the "ozone hole".

In addition to the discovery of the ozone hole in 1985, a number of other forces helped to place the issue on the government decision agenda. 1985 saw the signing of the Vienna Convention which called for continued research on ozone depletion as well as the NASA-UNEP report.

> In a 2000-page text, the report stated that symptoms of the greenhouse effect were becoming apparent and there was 'compelling evidence' that trace gases, such as CFCs, were increasing on a global bases. If CFC emissions continue at 1980 rates, the report concluded, the average amount of ozone would fall 4.9 to 9.4 percent by the middle of the next century....In a pointed message to world leaders, the report suggested: "We should recognize that we are conducting a giant experiment on a global scale by increasing concentrations of trace gases in the atmosphere without knowing the environmental consequences" (Roan, 1989:143).

The ripe issue climate, heightened media attention and discussion by high officials, particularly those at UNEP, all support Cook's model of converging forces.

CHAPTER 7

EVALUATING COOK'S MODELS

What Cook's Model Left Out

Cook's models attempt to examine the rise and decline of issues on governmental agendas in a holistic manner. The following discussion considers, therefore, additional variables of importance to the CFC-ozone issue which have, to this point, been neglected. These include two concepts discussed by Kingdon, namely policy entrepreneurs and policy windows, and the factor of political will.

Kingdon's distinction between governmental agenda and decision agenda proves very important to an evaluation of the rise and fall of the CFC-ozone issue on the formal agenda.

> The governmental agenda is the list of subjects to which people in and around government are paying serious attention at any given point in time....Within that governmental agenda, there is a smaller set of items that is being decided upon, a decision agenda (Kingdon, 1984:174).

Kingdon speaks in terms of a "queue of items waiting for their turn on a decision agenda. The opening of a window often establishes the priority in the queue" (Kingdon, 1984:175). The opening of a window may be caused by a variety of events. In the CFC-ozone case the discovery of the ozone hole opened

the policy window. Despite the tremendous ramifications of ozone depletion, this issue, like all others, only presented a fleeting opportunity for players to act. It would not be long before "euphoric enthusiasm" (Downs) gave way to a recognition of the obstacles involved in legislating change. One must also be careful to act before the issue is reformulated. In the case of CFCs and ozone depletion, the issue seems to have been expanded rather quickly to encompass the larger concept of global climate change.

Waiting for the moment of opportunity are the policy entrepreneurs Kingdon speaks of. Policy entrepreneurs are defined by Kingdon as:

> Advocates who are willing to invest their resources - time, energy, reputation, money - to promote a position in return for anticipated future gain in the form of material, purposive, or solidary benefits (Kingdon, 1984:188).

Policy entrepreneurs are heard based on their expertise, their ability to speak for others and often are the leader of a powerful interest group. They have established political connections, strong negotiating skills and are generally persistent in their manner. They spend their time giving talks, writing letters and position papers and they testify at committee hearings.

Policy entrepreneurs are found in all areas. The executive director of the UNEP, Dr. Mostofa Tolba, is one such example. In Canada, Environment Canada's Victor Buxton is

another. As Canada's delegate to the Montreal Conference (1987) as well as a leading expert on the technical aspects of the CFC-ozone issue, Mr. Buxton has ensured that senior government officials are aware and acting on the issue. Julia Langer of Friends of the Earth is another example of a policy entrepreneur. The organization Friends of the Earth (FOE) became involved with the issue in 1987 primarily as a result of changes implemented by its new executive director, Julia Langer. Ms. Langer has become a major force in educating the public through the efforts of the environmental group Friends of the Earth and through her expert use of the news media.

Expanding the CFC-ozone issue to the public agenda was necessary for the realization of the issue on the federal government decision agenda. In this case, science played a crucial part in the process. Faced with the daunting task of convincing the public and policy makers of the threat of CFCs to the environment, scientists Rowland and Molina stepped beyond the 'normal' bounds of science to advocate a legislative response to the CFC-ozone issue. Part of this process involved influencing public opinion. Both Benedick and Lang consider public opinion a major factor in the success of the Montreal Protocol. Benedick's interpretation, however, implies that public opinion was manipulated to mobilize political will. He states that, "public opinion must be adequately informed in order to mobilize the political will of nations." (Benedick, 1989:46) In Phase I of the CFC-

ozone issue, the political will for the aerosol ban appeared to originate with the general public. In Phase III, however, it seems that political will was generated to effect the implementation of the international treaty, and in so doing it also helped form the national response to the treaty. For this, the government turned to groups such as Friends of the Earth to inform the public and to generate public support.

According to Kingdon, the impact of public opinion on agenda formation is usually in the form of reacting to proposed issues rather than suggesting issues for the agenda. Public opinion, "might thrust some items on the governmental agenda because the vast number of people interested in the issue would make it popular for vote-seeking politicians" (Kingdon, 1984: 68). Or it may constrain the government from taking action. "Public Opinion may direct government to do something, but it more often constrains government from doing something" (Kingdon, 1984: 69). The public's ability to affect the agenda is limited by what information it has access to. As a result, the mass public is more likely to affect the agenda rather than the alternatives.

> Public opinion may set limits on the possibilities and may affect an agenda of subjects in a general way, but the general public opinion is rarely well enough formed to directly affect an involved debate among policy specialists over which alternatives should be considered (Kingdon, 1984:70).

It would seem that this was true of the CFC-ozone debate. Public opinion played a major role in defining the broad issue of the environment as a top agenda item. The international community, particularly UNEP, chose the CFC-ozone theory as its major focus for the 1980's. This may have been a logical step in working toward limiting the effects of global climate change. Benedick, who was the chief U.S. negotiator for the Vienna Convention, states ones of the reasons for the success of the Montreal Protocol was that it simplified a greater environmental challenge. "The problem of climate change was disaggregated from a complex problem to a manageable one of ozone depletion caused by CFCs" (Benedick, 1989:46).

CHAPTER 8

CONCLUSION

Cook has proposed a model to explain how issues decline on policy agendas. To understand this concept, however, one must also understand the multiple forces which work in unison to place an issue on the government agenda and maintain it there. The model which attempts to explain the rise of an issue on the government policy agenda is the Convergent Voice Model. It posits that for an issue to gain agenda status it must be simultaneously articulated by groups both within and without government and at the same time legitimized by social science data, media attention, discussion by high officials and interest group endorsement.

After examining the issue of CFCs and ozone depletion it appears that the issue rose to agenda status in the late 1970's primarily as a result of the public attention the issue received. Although government activities were initiated prior to the boycott of aerosol products, without the legitimization of absolute scientific evidence it seems unlikely that the issue would have reached the decision agenda. Four years prior to legislation in Canada, the issue was losing steam in the United States as a result of the 1976 National Academy of

Science's report. Legislation was passed in the United States, however, in response to public pressure and Canada followed the American example.

Cook's theory of issue decline posits that:

> Issues will decline in salience if a credible counter voice presents a different view of the issue, a view that causes advocates to reformulate the problem to one most persons would judge less important. If the relevant federal agencies choose to devote less attention and resources to the issue, if media attention declines and if a policy community can never unite around a core problem and a preferred policy solution, a policy cannot remain high on the legislative agenda (Cook, 1982:28).

Cook's model of issue decline well describes the decline of the CFC-ozone issue on the federal policy agenda. The CFC-ozone issue had, up to this point, been treated as the 'aerosol' issue. This may have been the work of industries seeking to disaggregate themselves from the overall issue or it may simply have been easier to generate the political will of the nation behind an easily identified target. Following the ban on aerosols, however, the production of CFCs increased tremendously, quickly making up for the losses caused by the ban. The ban also served to diffuse the issue by allowing the public and legislators to believe that the problem had been solved. In order for further restrictions to take place, the issue had to be reformulated to encompass the broader issue of CFCs in all their uses not solely as propellants in aerosols. In the early 1980's this proved difficult.

Scientific uncertainty was just as great as it had been when Rowland and Molina first brought the problem to the attention of policy makers. It could be said to have been even greater as more and more scientists and organizations became involved in trying to establish the validity of the CFC-ozone theory. The coming to power of the Reagan adminstration and its anti-regulation policies diffused the issue even more and caused attention within agencies such as the EPA to turn to other issues. The decrease in government attention to the issue and the lack of scientific consensus was visible in the decline in media attention. All of these forces worked to remove the CFC-ozone issue from the government policy agenda.

During Phase II of the evolution of the issue, the issue was reformulated from the aerosol issue to the CFC-ozone issue. It was also reformulated from a national issue to an international one and was adopted by UNEP as a priority issue for the 1980's. This kept the issue within reach of the policy agenda as it continued to be a concern for individuals within government departments.

By the mid-1980's the issue was once again vying for a position on the government policy decision agenda. This time scientific consensus was quickly developing as a result of the discovery of the ozone hole over Antarctica. At the same time, there had been great strides in the international arena with the signing of the Vienna Convention and work towards the formulation of an international treaty to control CFC

production was also in the works. The discovery of the ozone hole created a powerful image that was grabbed by the media and media attention once again focused on the CFC-ozone issue. It appears that in this phase, Cook's convergent voice model can be used to explain the issue's rise on the agenda.

Cook's models can be used to explain the rise and fall of the CFC-ozone issue on government agenda. One should recognize, however, that in identifying the multiple forces which converge to place an issue on the agenda, some forces wield greater influence than others. This was certainly the case with the CFC-ozone issue. The role of industry in dictating whether or not a ripe issue climate existed or not cannot be ignored.

One should also keep in mind that a constant level of awareness, such as that characterized by the public consensus on environmental issues, does not necessarily translate into environmental issues being dominant policy priorities, nor that being a dominant policy priority guarantees a place on the government decision agenda. The opening of a policy window is a rare and brief opportunity. In the case of CFCs and ozone depletion, it took a focusing event such as the discovery of the ozone hole, to create such an opening. This implies that, although interest groups must be constantly pressuring government for attention, often they must simply be prepared to grab the opportunity that an open policy window provides. For environmental groups, this usually means

knowing how to use the media. The goal is to garner enough support for an issue to initiate government action before the policy window closes and before another issue moves onto the agenda.

One may conclude from this study that Cook's models of issue rise and decline do prove useful in determining the many forces which place an issue on the government policy agenda. Variables such as industry influence on policy makers may complicate the process, however, and must be taken into consideration. Whether or not these models can be used to explain the progression of other environmental issues on the government agenda is subject to further investigation.

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APPENDIX

CHRONOLOGY OF EVENTS

APPENDIX

Chronology of Events*

December 1973: Rowland and Molina discover that CFCs can destroy the ozone in the stratosphere.

June 1974: Rowland and Molina's paper on their discovery is published in Nature.

September 1974: Rowland and Molina discuss their theory publicly for the first time at the American Chemical Society meeting in Atlantic City.

October 1974: A [U.S.] government committee recommends that the National Academy of Sciences conduct a study on the validity of the CFC-ozone theory.

December 1974: First [U.S.] government hearings are held on the CFC-ozone theory.

May 1975: The CFC-ozone theory is hotly debated at the American Chemical Society meeting in Philadelphia.

June 1975: The Natural Resources Defense Council [NRDC] sues the Consumer Product Safety Commission for a ban on CFCs in aerosol spray cans.

Johnson Wax, the nation's fifth largest manufacturer of aerosol spray cans, announces it will stop using CFCs in its products.

A government task force, the Committee on the Inadvertent Modification of the Stratosphere (IMOS) defers the decision to regulate CFCs to the impending NAS report.

July 1975: The Consumer Product Safety Commission rejects the NRDC's lawsuit saying there is insufficient evidence that CFCs harm the ozone layer.

APPENDIX (cont'd)

September 1976: The National Academy of Science [NAS] releases its report verifying the Rowland-Molina hypothesis, but says government action on CFC regulations should be postponed.

October 1976: The Food and Drug Administration [FDA] and the Environmental Protection Agency [EPA] propose a phase out of CFCs uses in aerosols.

March 1977: The United Nations Environmental Programme [UNEP] holds the first international meetings to discuss ozone depletion.

May 1977: Several government agencies in the U.S. announce joint plans to limit the uses of CFCs in aerosols.

July 1977: Harvard scientist Jim Anderson finds an abnormally high level of chlorine oxide in the atmosphere, throwing the CFC-ozone theory into question.

February 1978: Government [US] decides to postpone Phase Two regulations on CFCs used in refrigeration, air conditioning, solvents, and other industrial processes.

June 1978: The original deadline for Phase Two regulations passes with no action taken.

October 1978: CFCs used in aerosols are banned in the United States.

November 1979: A second NAS report on the CFC-ozone theory is released, putting depletion estimates at 16.5 percent and saying a "wait-and-see" approach to regulations is not practical.

March 1980: Canada prohibits the use of CFCs in hairsprays, deodorants and antiperspirants.

April 1980: The EPA announces the United States' intentions to freeze all CFC production at 1979 levels.

APPENDIX (cont'd)

October 1980: The EPA, under the Carter administration, released an Advance Notice of Proposed Rulemaking outlining plans for additional CFC regulations.

May 1981: EPA director nominee Anne M. Burford testifies at her confirmation hearing that she views the CFC-ozone theory as highly controversial.

July 1981: Hearings are held in Washington to discuss protection of small businesses from possible new CFC regulations. Hearings are highly critical of the Advanced Notice of Proposed Rulemaking.

August 1981: NASA scientist Donald Heath announces that satellite records show that ozone has declined 1 percent.

November 1981: Ad hoc meeting of senior government experts in environmental law in Montevideo, Uruguay. Canada supports a document presented by Finland and Sweden outlining the major elements and principles of a global convention.

March 1982: The NAS releases a third report on CFC-ozone and predicts eventual ozone depletion could be 5 to 9 percent.

March 1983: Burford resigns from EPA. Plans for additional CFC regulations are renewed under new EPA chief William Ruckelshaus.

April 1983: During international talks, Norway, Sweden, and Finland submit a world plan for a worldwide ban of CFCs in aerosols and limitations on all uses of CFCs.

February 1984: A fourth NAS report downplays the potential harm to the ozone layer from CFCs by lowering depletion estimates to 2 to 4 percent.

June 1984: At a scientific meeting in Germany, Rowland reports his calculations on heterogeneous

reactions involving hydrogen chloride and chlorine nitrate - reactions that could significantly speed up ozone depletion.

October 1984: A British research group led by Joe Farman detects a 40 percent ozone loss over Antarctica during the austral spring.

November 1984: The NRDC sues the EPA for failing to provide Phase Two regulations on CFCs as specified by the Clean Air Act.

January 1985: Lee Thomas takes over as EPA director.

March 1985: The Vienna convention, calling for additional research and the exchange of information on ozone depletion, is signed by international negotiators.

Negotiators fail to agree on worldwide CFC regulations.

May 1985: Farman's paper is published in Nature.

August 1985: NASA satellite photos confirm the existence of an ozone hole over Antarctica.

January 1986: A NASA-UNEP report warns that damage to the atmosphere is apparent.

EPA releases its Stratospheric Ozone Protection Plan which calls for new studies to determine whether additional CFC regulations are needed.

March 1986: Atmospheric scientists meeting in Boulder discuss plans for an expedition to Antarctica to study ozone depletion there.

June 1986: **Canada is the first country to ratify the Vienna Convention.**

Papers are published by two research groups indicating chemicals and polar stratospheric clouds are responsible for ozone loss over Antarctica.

Hearings on ozone depletion and greenhouse warming are held in Washington. Thomas announces that some government intervention may be needed to halt emissions of gases that could harm the atmosphere. Scientists testify that greenhouse warming has begun due to emissions of gases such as CFCs.

CFC manufacturers suggest that safe substitutes for the chemicals might be possible for a high enough price.

August 1986: Thirteen U.S. scientists depart for Antarctica on the National Ozone Expedition.

September 1986: A major CFC industry lobbying group announces it will support limits on CFC growth.

The Du Pont corporation announces it will call for worldwide limits on CFC production.

October 1986: During a press conference from Antarctic, U.S. scientists say they suspect chemicals are to blame for ozone losses there.

November 1986: Scientists favoring weather processes - or dynamical - explanations of the Antarctic ozone loss, air their views in a special edition of Geophysical Research Letters.

December 1986: International negotiations on ozone protection resume in Geneva after a 17-month layoff. The United States proposes worldwide CFC reductions of 95 percent by the next decade.

March 1987: New evidence supporting a chemical explanation for the ozone depletion in Antarctica is revealed at a scientific meeting in Boulder, Colorado.

April 1987: Under pressure form some high level officials, the U.S. backs off on its original position and proposes long-term CFC reductions of 50 percent.

APPENDIX (cont'd)

May 1987:	Harvard scientist Jim Anderson completes a key instrument for confirming the chemical theories on ozone depletion in time for upcoming expedition to Antarctica.
June 1987:	NASA's Donald Heath reports satellite findings of a 4 percent ozone loss detected over a seven-year period. A NASA sponsored study called the Ozone Trends Panel is organized to review the findings.
July 1987:	The State Department announces a Personal Protection Plan as an alternative to CFC reductions. The plan is widely ridiculed.
August 1987:	The McDonald Corporation, which uses CFCs in the making of polyurethane foam containers for hamburgers, announces it will stop using chemicals.
September 1987:	The Montreal Protocol is signed, calling for eventual worldwide reductions of 50 percent.
October 1987:	The Antarctic ozone expedition ends with chlorine chemicals found to be primary cause of ozone depletion.
November 1987:	A scientific conference confirms the findings of the Antarctic expedition.
	U.S. lawmakers call for new negotiations to strengthen the Montreal Protocol.
February 1988:	Three U.S. senators ask Du Pont to stop making CFCs.
March 1988:	The chairman of Du Pont denies the request to stop making CFCs.
	The U.S. ratifies the Montreal protocol in a unanimous vote.
	Three weeks after refusing to stop making CFCs, the Du Pont Corporation announces it will cease manufacture of the chemicals as substitutes become available.

APPENDIX (cont'd)

April 1988: Manufacturers of plastic foam food containers announce they will stop using CFCs.

May 1988: Preliminary findings of a hole in the ozone layer over the Arctic are discussed at a scientific conference in Colorado.

June 1988: Canada is the first country to ratify the Montreal Protocol.

A leading scientist says the greenhouse effect is impacting the earth and blames the use of synthetic pollutants for the global warming.

August 1988: The EPA orders domestic CFC reductions that mirror the terms of the Montreal Protocol.

September 1988: The EPA says new evidence shows that it underestimated the degree of ozone depletion and says 85 percent cutbacks on CFCs are needed.

Entry into force of the Vienna Convention.

October 1988: Scientists meeting in the Netherlands confirm the Ozone Trends Panel findings of ozone losses in the Northern Hemisphere.

January 1989: Entry into force of the Montreal Protocol.

February 1989: Canadian government announces legislation to phase out use of controlled CFCs.

March 1989: European countries and the United States agree to faster CFC reductions but developing countries oppose the new timetable citing the costs of substitutes and scientific uncertainty.

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* Source: Chronology of Events reproduced from Timeline in: Roan, S. (1989) Ozone Crisis. Toronto: John Wiley and Sons, Inc., pp. xiii-xvii.

APPENDIX (cont'd)

All items relate to the American experience except those specifically mentioning Canada. These have been taken from: Canada, Department of the Environment, "Ozone Layer Protection," March 1988.