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Science or Salience: Building an Agenda for Climate Change

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Introduction

Between 1985 and 1990 the climate change issue domain changed significantly. An issue that had been the domain of climatologists, oceanographers, and scientific bureaucracies moved rapidly into the world of international policy analysts, the public, environment ministers, presidents, and prime ministers. By 1988, the issue had reached the international agenda (Jäger and O'Riordan 1996; Mintzer and Leonard 1994; Social Learning Group 2001). Most accounts of the transition of the climate-change issue from the international science agenda to the international policy agenda note the importance of a series of international assessments organized and carried out by the International Council of Scientific Unions (ICSU), the World Meteorological Organization (WMO), and the United Nations Environment Programme (UNEP) between 1985 and 1987. In particular, the work of scientists and policymakers at meetings in Villach, Austria, is often singled out for attention.

A group meeting in 1985, relying on an assessment of the SCOPE committee of ICSU, determined that "substantial warming" would occur as a result of a doubling of CO_2, and noted that increases in CO_2 "were attributable to human activities." They urged governments to "consider future predictions about climatic change in decision-making about water resource management, agriculture, coastal engineering and energy planning." They called for governments to pay attention to the scientific conclusions presented by the group, urged dissemination of public information on greenhouse gases, and urged further research. They argued

that policies on energy, the use of fossil fuels, and greenhouse gas emissions could vastly affect the rate and degree of future warming. Finally, international agencies such as UNEP, WMO, and ICSU were encouraged to initiate consideration of a global convention (WMO 1986, 7).

The conclusions of the Villach meetings have been referred to as the consensus that set the climate issue on the road to the international agenda (Paterson 1996, 13). Indeed, within three years, the international community was paying significant attention to the issue. The climate case is often used as an example of scientific consensus creating the persuasive power necessary to achieve success in bringing about policy change (see Chapter 1, this volume). Most accounts of the development of the international policy agenda emphasize that Villach coincides with the burst of international interest in climate change but offer few reasons for attributing importance to these assessments. Such accounts, while providing excellent histories, rarely identify how, if at all, these assessments influenced the policymaking process (see, for example, Bodansky 1993; Social Learning Group 2001; Hecht and Tirpak 1995; Pomerance 1989; Boehmer-Christiansen 1994a, 1994b).

Conventional wisdom about the importance of the assessments of the mid-1980s is captured by Jill Jäger and Tim O'Riordan (1996, 14), who wrote about the Villach 1985 meeting: "Scenarios for future emissions of all of the significant greenhouse gases, not just CO_2, were considered and an international scientific consensus about the potential seriousness of the problem was achieved. The problem of anthropogenic climate change was moved at this point onto the political agenda." Such observations suggest several explanations for linking Villach to the development of an international agenda for climate change. First, these observations suggest that the consensus at Villach presented credible causal arguments and agreement about the relationship between human activities and changes to the earth's climate that drove the decision to take action. Second, the addition of greenhouse gases heightened the salience of these scientific problems for other actors in the international arena. Third, the international composition of this group allowed it to portray itself as a legitimate advocate for international policy change.

This chapter evaluates claims about credibility, salience, and legitimacy, with a view to understanding the extent to which these attributions of the Villach process contributed to its influence on the international arena. The chapter argues that the scientific conclusions reached at Villach were not significantly more credible than those of previous assessments, although years of consistent evidence contributed to the confidence of scientists and analysts in the information. The increased emphasis on greenhouse gases in addition to CO_2 was important, though the centrality of this finding was driven by perceptions on the part of assessors that the time might be ripe to emphasize the need for policy action on climate change. Events in the international arena, including the increased salience of environmental issues in general, and ozone depletion in particular, served to magnify the potential for climatic change for the scientists gathered at Villach, and led to particular efforts to identify climate change as the next salient issue for the international arena. At this task Villach largely succeeded. Villach became the voice for action as climate change entered an international arena that was receptive to statements on the subject. How important was the fact that the information came from an international group? Was Villach a legitimate source of scientific information? The answer to this question is largely yes, though this changes over time. As the climate issue became more salient (a process to which Villach contributed), the new actors in the issue domain began to make specific choices about the legitimacy of various assessment processes. While a process institutionally similar to Villach continued to provide information into the 1990s, new participants in the international arena, primarily states and their negotiators, turned to the Intergovernmental Panel on Climate Change, a new scientific assessment institution, for their scientific information.

This chapter contributes, along with chapters 5 and 7 to an understanding of how changes in the salience of an assessment propels information previously disregarded by policymakers (or groups of policymakers) into a position of persuasion and influence. The chapter also highlights, along with chapter 3, the key role of salience as an issue develops and the subsequent shift to concerns about legitimacy as an issue becomes established on the international agenda.

Change in the Issue Domain

As noted above, an issue that was largely in the domain of scientists doing primary research or working on national scientific panels moved rapidly (in three years) to the agenda of national governments and the United Nations. Starting in 1985, the participants interested in the climate issue dramatically changed, policy statements called for international cooperation to reduce CO_2 and greenhouse gas emissions, and the institutional organization of scientific information was transformed. Although it is difficult to track precisely the new additions to the climate discussion, the path of Villach's conclusions can be traced through several initiatives undertaken by the United Nations during this time period.

What evidence demonstrates that the issue domain had been transformed by 1988? In 1987, the United Nations General Assembly adopted several resolutions, including one that stipulated that

> international cooperation for the monitoring of the accumulation of carbon dioxide and other greenhouse gases and of their impacts on climate and sea levels must be strengthened to encompass both the conclusion of international agreements and the formulation of industrial strategies to mitigate the environmental, economic, and social impacts of potential changes. (A/RES/42/186, 96th plenary meeting, December 11, 1987)

Events in 1988 mark particularly significant changes in the issue domain. A conference held in Toronto in June brought together over 300 delegates, including politicians, senior government officials, scientists, industry representatives, and environmental activists representing over 40 countries and 24 international organizations. Although not officially governmental, the conference brought many new actors into the issue domain. The Toronto Conference concluded by urging "immediate action . . . to counter the ongoing degradation of the atmosphere. . . . An Action Plan for the Protection of the Atmosphere needs to be developed, which includes an international framework convention, [and] encourages other standard-setting agreements and national legislation to provide for the protection of the global atmosphere" (WMO, 1989, 296). The mostly widely cited conclusion of the conference was the need to "reduce CO_2 emissions by approximately 20% of 1988 levels by the year 2005 as an initial global goal" (WMO 1989, 296).

The Toronto Conference has been widely cited as a watershed that met a growing public demand for information. In 1988, the United Nations General Assembly (UNGA) resolved to establish the Intergovernmental Panel on Climate Change (IPCC) and urged initiation of climate negotiations, specifying elements to be considered in a possible convention. In 1989, both the Group of Seven industrialized nations and the Group of Seventy-Seven developing states issued communiqués calling for action to "limit emissions of carbon dioxide and other greenhouse gases" (Markham 1989, 1). By the end of 1989, a Declaration adopted at Noordwijk, the Netherlands, by a Ministerial Conference attended by representatives of over fifty countries, noted that there was a "growing awareness among the world population and their political leaders that action is needed" (Noordwijk Conference Report 1989, 19). In December 1989, the UNGA authorized "the Executive Director of the United Nations Environment Programme, in cooperation with the Secretary-General of the World Meteorological Organization, to begin preparations for negotiations on a framework convention on climate" (UNGA 44/207, December 22, 1989).

Other indicators also suggested that international attention to the issue had increased. International media attention to the problem of climate change began a steep rise in 1987–1988, peaking in 1990 (Social Learning Group 2001). In December 1990, the UNGA established the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) to prepare an effective framework convention on climate change. The INC held five sessions between February 1991 and May 1992. "During these meetings," according to an online summary, "participants from over 150 states discussed the issues of binding commitments, targets and timetables for the reduction of carbon dioxide emissions, financial mechanisms, technology transfer, and 'common but differentiated' responsibilities of developed and developing countries" (http://www.iisd.ca/linkages/climate/fcccintro.html, 3/19/99). The Framework Convention on Climate Change was delivered to the United Nations Conference on Environment and Development in the summer of 1992. By that year, a variety of participants in addition to states—including nongovernmental organizations and industry lobbyists—had vastly increased their participation on the issue,

mounting publicity campaigns, lobbying national governments, and participating in the international negotiations.

Scientific Credibility

The development of scientific consensus often receives considerable attention in accounts of the development of international polices on environmental issues, as chapter 1 of this volume notes. Richard Cooper's (1989, 180–181) account of the development of international public health guidelines from the nineteenth century illustrate his claim that "so long as costs are positive and benefits are uncertain, countries are not likely to cooperate systematically with one another; and so long as sharply differing views are held on the relationship between actions and outcomes, at least some parties will question the benefits alleged to flow from any particular proposed course of action." Haas (1990) and Benedick (1991) also emphasize this in the cases of the Mediterranean Plan and Montreal Protocol, respectively.

Observers of the development of the climate-change issue also suggest that it received serious attention in the 1980s because of the "maturity" of science. Although the evidence presented at the first World Climate Conference in 1979 "was scary," it took several years for scientists to come up with more evidence. But by the mid-1980s, according to conference participants, "the science was solid" and "the pot was boiling." These claims suggest that the conclusions reached at Villach represented greater agreement than had hitherto been present in the international scientific community.

For more than three decades prior to 1985, international initiatives to evaluate the science of climate change had been underway. The history of climate science has been well documented (Ausubel 1983; Clark and Dickson 2001; Jäger and O'Riordan 1996; Kellogg 1987; Moomaw 1990; Paterson 1996). Beginning in the nineteenth century, several scientists presented theories about the effects of carbon dioxide on the atmosphere. In the mid- to late 1950s, more scientists began to address the possible effects of carbon dioxide on the atmosphere. By the late 1970s, a considerable body of scientific evidence concerning climate change and the effects of carbon dioxide had developed. During the

International Geophysical Year (July 1957–December 1958), Charles Keeling had begun regular measurements of CO_2 at Mauna Loa and by the 1970s they clearly demonstrated steadily increasing concentrations of CO_2 in the atmosphere (Paterson 1996, 22). Atmospheric scientists were beginning to generate general-circulation models of the atmosphere that could estimate the response to a doubling of CO_2 concentrations from its preindustrial values (Jäger and O'Riordan 1996). Scientists and scientific reports were increasingly reaching scientific conclusions about the climate change problem, including

Projected temperature warming due to a doubling of CO_2

Date by which this warming is expected to occur

Relative contribution of CO_2 and other gases

Comparisons of predictions over time suggest that the conclusions reached in 1985 were not significantly different from those that came before them. First, the predicted range of temperature change in response to a doubling of CO_2 had remained very steady at 1.5°C to 4.5°C from a 1979 United States National Academy of Sciences report "up to and including the 1994 IPCC assessment" (Jäger and O'Riordan 1996, 14). Indeed, the SCOPE report and Villach's presentation of it *widened* the range of uncertainty and projected a slower pace than the earlier Villach conclusions (World Climate Programme 1981). Table 2.1 summarizes both international and national (U.S.) assessment conclusions, showing that scientific information related to CO_2, warming rates, and time frames remained quite stable over time.

However, other greenhouse gases are reported to have been significant during the deliberations that took place at Villach in 1985. Some analyses have argued that Villach was a "catalytic event" in reshaping the debate over climate change, particularly in the United States; "Villach's reframing of the climate issue allowed it to be amplified through independently increasing concerns over stratospheric ozone depletion" (Clark and Dickson 2001, 269). Did Villach represent a significant change, presenting policy recommendations that emphasized greenhouse gases, or did international opportunity present an incentive to emphasize the role of greenhouse gases in a way that they had not been before? Was this the triumph of new information that reshaped views of the need

Table 2.1
Comparing scientific conclusions

Organization	Range[1]	Year	CO_2 vs. other
National Research Council, 1979	3 ± 1.5	By 2050[2]	
Department of Energy, 1979	2–3	By 2050[3]	
National Research Council, 1983	1.5–4.5	By 2050[4]	Will contribute[5]
Environmental Protection Agency, 1983	3 ± 1.5	By 2050[6]	May contribute[7]
Department of Energy, 1985 "State of the Art" Reports	1.5–4.5	By 2075[8]	May contribute[9]
SCOPE/Villach, 1985	1.5–5.5	2050–2100[10] 2030[11]	Can contribute
Environmental Protection Agency, 1989	1.5–4.5	By 2030[12]	Can contribute
Intergovernmental Panel on Climate Change	1.5–4.5		

1. Warming range based on a doubling of CO_2 or CO_2 equivalent.
2. "Have assumed a rate of CO_2 increase that would lead to a doubling of airborne concentrations by some time in the first half of the twenty-first century" (National Research Council 1979, 1).
3. "Reach double the present value some time around the middle of the next century" (Department of Energy 1979, 143).
4. Estimate that it will pass 660 ppm (nominal doubling) in the 3rd quarter of the next century (National Research Council 1983, 2).
5. "Several other gases besides CO_2 that can affect the climate appear to be increasing as a result of human activities; if we project increases in all these gases, climate changes can be expected significantly earlier than if we consider CO_2 alone" (National Research Council 1983, 2).
6. Doubling of preindustrial levels (EPA 1983).
7. "Several gases in the atmosphere exhibit the properties of a greenhouse gas. Carbon dioxide is the most abundant and best known. Other potential significant greenhouse gases include methane, nitrous oxide, and chlorofluorocarbons" (EPA 1983, 2–2).
8. Doubling of current levels (Department of Energy, 1985 "State of the Art" Reports).
9. "If increases in their concentrations continue, these trace gases could have significant effects on climate" (Department of Energy, 1985 "State of the Art" Reports, 193).
10. Low- to middle-range scenarios (SCOPE/Villach 1985).
11. When contributions of other greenhouse gases are considered, "equivalent of CO_2 doubling" (SCOPE 1986, xxvii and WMO 1986).
12. "Several other gases besides CO_2 that can affect the climate appear to be increasing as a result of human activities; if we project increases in all these gases, climate changes can be expected significantly earlier than if we consider CO_2 alone" (EPA 1989).

for action or was information simply being viewed through a new lens, one that increased its salience?

More Salience Than Science

Several scientists have noted that evidence regarding the role of other gases in climate change led them to realize that significant global warming could occur within their lifetime (or at least in the lifetimes of their children). Including non-CO_2 greenhouse gases in climate models led to projections of major climate change within thirty to fifty years, rather than late in the next century. For them, this meant that climate change was not a problem that could wait to be addressed. Bert Bolin highlighted this new perspective in recounting the process of preparing the SCOPE report:

> An important paper by Ramanathan et al. became available towards the end of the assessment, in which the role of other greenhouse gases in enhancing the greenhouse effect was pointed out. These other gases proved to be as important as CO_2. Suddenly, the climate change issue became much more urgent. The radiative forcing of the atmosphere, corresponding to a doubling of the CO_2 concentration, was anticipated by about 2030 rather than during the latter part of next century. (WMO, 1986, 26)

As Jim Bruce, chair of the Villach conference, observed, the finding that other greenhouse gases had the radiative equivalence of CO_2 made greenhouse gases "the biggest buzz of the conference." The written record suggests that the addition of other greenhouse gases to the climate change calculus was an essential consideration for the participants of this conference. Mostafa Tolba of UNEP and Donald Smith of WMO mention the contribution of greenhouse gases as a factor that tipped the balance in favor of action to stem global climate change. Noted Tolba, "It is now estimated that by adding in the warming effect of other trace gases the equivalent of such a [CO_2] doubling may occur as early as 2030. Trace gases seem to be playing a much larger role in bringing about a greenhouse effect than was earlier expected" (WMO 1986, 11).

Although great attention is often paid to the publication of these findings by Ramanathan et al. in 1985, the Villach conference was not the first time this finding had been presented. The claim had been made in

the scientific and assessment literature for years. Others noted the potential contribution of other greenhouse gases. National scientists reported on it via the National Research Council in 1983, as well as through the U.S. government over the years (Department of Energy in 1979 and 1985; Environmental Protection Agency 1983).

In fact, the NRC report made a very compelling argument for the idea that CO_2 should not remain the sole focus of research efforts, or, more importantly, the sole focus of the formulation of solutions. However, the NRC noted that its primary focus was on CO_2, with a bit of attention paid to other greenhouse gases, for reasons having explicitly to do with the mandate and sponsor of the assessment: the U.S. government. As Tom Schelling put it,

> The protagonist of this study has been carbon dioxide. The research has been motivated by concern that atmospheric carbon dioxide is increasing and may increase faster as the use of fossil fuels continues to grow and by the known potential for a "greenhouse effect" that could generate worldwide changes in climate. The group responsible for the report is the Carbon Dioxide Assessment Committee; the study was authorized by an act of Congress concerned with carbon-intensive fuels; and the agency principally charged with managing the research is the Department of Energy. The topic is usually referred to as "the carbon dioxide problem," a global challenge to the management of energy resources. (National Research Council, 1983, 450)

The NRC report concluded that scientific uncertainties surrounding projection of future CO_2 emissions were sufficiently great that no statements of the certainty of future climatic changes, or the consequences thereof, could or should be made. As such, they suggested further research, rather than quick policy action to address fossil-fuel use.

The U.S. Department of Energy cautioned that further research was needed, and that the time was not right for extensive action on climate change. The 1983 conclusions of the Environmental Protection Agency wistfully hoped for international cooperation, but deemed it a "distant prospect," concluding that the development of national adaptive strategies was probably the only tenable approach. These observations suggest that salience levels were not sufficient for these assessment groups; the likelihood of getting policy action on climate change on the international agenda was very low. Thomas Malone, the chair of the 1983 NRC report, testified before Congress in 1984 about the need for "caution not

panic," elaborating the uncertainties in climate science.[1] In concluding remarks to the Villach conference, Malone noted that "as a reversal of a position I held a year or so ago, I believe it is timely to start on the long, tedious and sensitive task of framing a CONVENTION on greenhouse gases, climate change, and energy" (WMO 1986, 33). Malone (who had also participated in a 1975 WMO Panel on Climate) noted as well that the most important development of the last decade was "the finding that increases in the 'other' greenhouse gases . . . have contributed about one half of any equilibrium temperature change that might be ascribed to the increase in CO_2," and these findings moved the date of potentially serious environmental consequences forward by several decades (WMO 1986, 33).

However, careful readers will recall that Malone's report did include other greenhouse gases in its analysis, yet it advocated caution. For Malone, and perhaps for others, there is more to the story of the decision for action. Malone cited several other developments of the latest decade, including improvements in climate models and attention to the impact of climate change on ecosystems.

However, he ultimately concluded that a decision to initiate contact between scientists and policymakers was timely. He noted that there had been a growing perception that there was a wide range of human activities that could "produce changes on a global scale." The ozone agreement, he suggested, was indicative of this change in perception. This stands in stark contrast to the conclusion that the NRC report reached about the likelihood of achieving international agreement on climate change. In 1983, the NRC report concluded that

> given the need for widespread, long-term commitment, a CO_2 control strategy could only work if major nations successfully negotiated a global policy. While such an outcome is possible, there are few examples where a multinational environmental pact has succeeded, the nuclear test ban treaty being the most prominent. Other clearly recognized problems—whale fisheries, acid rain, undersea mining, the ozone layer—emphasize how time on the order of decades is required to achieve even modest progress on international management strategies. (National Research Council 1983, 70)

By March 1985 the Vienna Convention for the Protection of the Ozone Layer had been adopted. UNEP, and Tolba in particular, were encouraged by their success in negotiating the ozone agreement, and had

determined that a convention on climate change could be their next endeavor. Peter Usher, a major representative of UNEP in the ozone negotiations, notes that as a result of the success of negotiating the Vienna Convention, UNEP had found a niche as a broker of conventions, and it was a role that UNEP wanted to continue. Tolba and the scientists involved in the Villach meetings saw a window of opportunity through which they could push climate change. Like Malone, they viewed the ozone agreement as a breakthrough in the treatment of global environmental issues.

Most, if not all, of those who made formal statements to the Villach gathering mentioned the connections that needed to be drawn between climate change and other environmental issues, particularly ozone depletion. James Bruce's remarks emphasized the connections between acid rain, ozone depletion, and climate change. William Clark's account of the practical implications of increasing greenhouse gas emissions noted that the problem of greenhouse gases was "intimately linked to other problems." The general thrust of the remarks was that tackling one global atmospheric issue necessitated consideration of a spate of others.

The SCOPE report, together with the Villach conference, differed from prior assessments. The conclusions reached about the need for action were different from those reached by other agents during the same (and slightly earlier) period. The most significant difference concerns recommendations for policy response. The SCOPE report (1986, 7) was the first to state that "substantial warming" would occur as a result of a doubling of CO_2, to note that increases in CO_2 "were attributable to human activities," and to recommend a variety of specific policy actions. Interestingly, despite the emphasis on other greenhouse gases, the statements of the Villach conference still underscored the important role of CO_2, as do most subsequent policy statements.

Compared to previous international and national reports, the final 1985 Villach report made bolder statements about the implications of the scientific findings for policymaking. It urged more significant steps toward international cooperation and called for governments to recognize that future climate change could be stemmed by attention to policies concerning fossil-fuel use, energy conservation, and greenhouse gas emissions. These conclusions stand in contrast to those reached by WMO, UNEP, and ICSU, gathered in Villach in 1981. These organizations concluded that

> the probability that potentially serious impacts may be realized is sufficiently great that an international commitment to a programme of cooperation in research is required to illuminate the issues and to reduce uncertainties so that the dimensions and time scale of the problem can be more reliably ascertained. (World Climate Programme 1981, 2)

Writing for the Environmental Protection Agency in 1983, Seidel and Keyes concluded:

> In the absence of growing international consensus on this subject, it is extremely unlikely that any substantial actions to reduce CO_2 emissions could or would be taken unilaterally. Adaptive strategies undertaken by individual countries appear to be a better bet (p. ix). Given these competing interests [conflicts between developed and developing countries], the future of any international accord remains, at best, a distant prospect. (chap. 5, 18)

Salience and opportunity were perhaps more important than greenhouse gases in driving these conclusions. However, greenhouse gases did provide a handy link to other issues in active negotiation.

Salience and the Issue Domain

The Villach gathering provided an opportunity for climate scientists to acknowledge internationally the importance of climate change, as a scientific matter, but more critically, as a policy matter. They discussed this significance with one another, and began to highlight these features to policy-relevant actors at home, just as PHARE and World Bank representatives did in the case study presented by Andonova (chapter 6, this volume). They concluded:

> Many important economic and social decisions are being made today on long-term projects . . . all based on the assumption that past climatic data, without modification, are a reliable guide to the future. This is no longer a good assumption since the increasing concentrations of greenhouse gases are expected to cause a significant warming of the global climate in the next century. (WMO 1986, 1)

Anecdotally, Steve Schneider notes that it was in the 1970s that media stories about the "human impact on the global climate first started

appearing" (1989, 191). These stories gradually made their way onto the front pages of newspapers and magazines, particularly in the 1980s (Schneider 1988; 1989, 194). Businesses and other institutions were increasingly discussing climate issues. Many of the Villach participants connected the conclusions they reached at the conference to initiatives that were developing at home.

As was the case for LRTAP and POPs, the rising salience of the issue brought a new audience (see chapter 7, this volume). The group gathered at Villach included not only those scientists who had been concerned with questions related to climate change, atmospheric chemistry, and meteorology, but those who were biologists and other natural scientists who had not been principally concerned with climate, as well as engineers. It was a group that was more inclined to consideration of the practical implications of scientific findings, by virtue of their capacities in government bureaus. These government scientists had not been deeply involved with climate science and were surprised by the findings, as well as by the implications for the speed with which changes in climate change could occur. For example, Pier Vellinga—a seacoast engineer who joined the Villach process shortly after 1985—said the findings of Villach forced him to realize that even the lower bounds of climate-change predictions would necessitate a transformation of his whole field. Jim Bruce, then assistant deputy minister for the Atmospheric Environment Service in Canada, was approached by a representative of the government of the province of Alberta. The official wanted to know if they were "throwing good money after bad" when they bailed out drought-stricken farms, asking whether the area was simply going to be a dry area in the future. These scientists returned home with the messages from Villach, and continued with international initiatives.

The creation of the Advisory Group on Greenhouse Gases (AGGG) was intended to further examine the science and its implications for policy and make recommendations on the development of a climate convention. This group met in Villach in July 1986. The experts (nongovernmental scientists) were nominated (two each) by UNEP, WMO, and ICSU. The AGGG approved a plan for a conference to be organized under its auspices. Discussions at the first meeting of the AGGG led Gordon Goodman (the Beijer Institute), Michael Oppenheimer (Environmental Defense Fund), and George Woodwell (Woods Hole Research Center) to organize a set of workshops designed to address questions of policy response to climate change (Jäger 1990).

The 1987 Villach/Bellagio meeting was the first meeting of the AGGG and provided an opportunity for the activist scientists to begin an initiative to pursue further links to policy. This conference emphasized that the scientific consensus reached at the Villach 1985 conference, along with the conclusions reached at the Villach meeting, should be used as a starting point for both of the 1987 workshops. The basic conclusions of the workshop differed very little from those of Villach 1985. According to Michael Oppenheimer, one of the organizers of the 1987 meetings, "The sponsors of the Villach and Bellagio workshops in 1987 hoped to provide a bridge between the 1985 Villach conference, which found that the issue of climatic change merited the attention of policy-makers, and the actual elaboration of specific measures to limit or adapt to warming" (Oppenheimer 1989, 3).

This group reflected carefully on the uncertainties that faced both climate scientists and policymakers in evaluating the effects of greenhouse gases and climatic changes. They concluded that "a coordinated international response seems inevitable and rapid movement towards it is urged" (World Climate Programme 1988, 37). The group advocated the prompt approval and ratification of the ozone protocol, examination of national energy policies, consideration of the issue of deforestation, evaluation of non-CO_2 greenhouse gases and limitation of the growth of their concentrations in the atmosphere, careful consideration of policies to manage sea-level rise, and continued scientific research. They concluded that the report should be used by the AGGG to further scientific and policy research, and to inform the discussion about the development of an international agreement on climate change.

The information conveyed by the Villach and Bellagio conferences had observable connections to the international scientific information environment and the international policymaking community. The statements issued at Villach and Bellagio were used to inform the deliberative process of the Toronto Conference in 1988 and the UNGA decision to initiate climate negotiations, via the 1987 World Commission on Environment and Development or "Brundtland Commission" report. All

nations, the report notes, face suffering caused by "releases by industrialized countries of carbon dioxide and of gases that react with the ozone layer, and from any future war fought with the nuclear arsenals controlled by those nations" (World Commission on Environment and Development 1987, 22). The Commission consulted with thousands of individuals from around the world, heard hours of testimony in public hearings, and read numerous submissions. On the issue of climate change, the report noted that, based on the scientific evidence, particularly in light of the many complexities and uncertainties, "it is urgent that the process [of taking action] start now" (p. 176). Specifically, how did Villach come to be reflected in the Brundtland Commission report?

Gordon Goodman, key Villach participant and member of the AGGG, was directly involved in the work of the Brundtland Commission. He served as part of a "Group of Special Advisers" on Energy; several observers of climate science, including Bert Bolin, credit him with drafting the sections of the report concerned with climate change. Indirect consultations between the Commission and others who contributed to the Villach conclusions is likely, but no direct trail is apparent.[2]

The report's discussion of climate change draws almost exclusively on the Villach findings, frequently citing or paraphrasing the Villach 1985 text. The Brundtland Commission and its report enjoyed a high profile; the report was reprinted numerous times and raised the profile of many global environmental issues. The Commission report was presented to the UNGA in 1987, and the conclusions about climate change were used to underpin their resolutions establishing an intergovernmental science advisory panel and, more importantly, to initiate intergovernmental negotiations on the subject.

In 1988, when the UNGA resolved to establish the IPCC and urged the initiation of climate negotiations even more seriously, it drew directly on the Brundtland Commission report and the conference at Villach. The UNGA recognized the contribution that these works had made to the "emerging evidence [which] indicates that continued growth in atmospheric concentrations of 'greenhouse' gases could produce global warming with an eventual rise in sea levels, the effects of which could be disastrous for mankind if timely steps are not taken at all levels" (UNGA 43/53).

The Brundtland Commission report and the Villach/Bellagio conclusions came together in another venue as well. The Canadian Atmospheric Environment Service (AES) and the Canadian government had an interest in establishing a leadership position for Canada on global environmental issues. The AES used the public hearings of Brundtland to offer to host a major international conference on the global atmosphere: climate change was proposed as the first topic to be considered. The conference was timed to occur after the release of the Brundtland report.

The conclusions of the Villach process informed the conference through a background paper, written by Jill Jäger, who edited accounts of both the 1985 Villach and 1987 Villach/Bellagio conferences. The background paper was intended to provide a common point of departure for conference participants. The conference organizers brought working-group chairs to Toronto in advance to do briefings based on this background document. The document reiterated many, if not most, of the arguments put forward by the Villach groups concerning the seriousness of the climate problem and the urgency of action. Recommendations for policy action echoed the Villach/Bellagio 1987 conclusions. The background paper advocated the development of a law of the atmosphere, which could "incorporate and build on other conventions and protocols such as the 1987 Montreal Protocol" (WMO 1989, 401).

When the Villach group was tapped for a contribution to the Toronto Conference in early 1987, neither that group nor the Toronto Conference planners could have foreseen the high profile that the Toronto Conference would enjoy in June 1988. By 1988, the climate change issue had moved from scientific circles and specialized agencies of the United Nations to the UNGA, and to the government and legislative offices of a number of countries. What happened in the summer of 1988 was an identifiable leap to the public arena, the highest levels of national governments, and the international agenda beyond the United Nations. These events greatly increased the salience of the Toronto conclusions.

By the time the Toronto Conference was convened in June 1988, a serious heat wave had occurred in the United States, and the media,

accustomed to using "weather hooks" (Schneider 1989) to write about climate change, had provided extensive coverage of the extreme weather and of its connections to climate change. The June heat wave was just the beginning. The summer was to be one of the hottest on record, and droughts occurred in many places in the United States. However, the June heat wave was enough to bring considerable attention to the Toronto Conference. As Steve Schneider (1989, 194) noted, "An international gathering in Toronto at the end of June attracted so many reporters that extra press rooms had to be added to handle the hordes of descending journalists." International media attention to the problem of climate change began a steep rise in 1987–1988, peaking in 1990 (Social Learning Group 2001).

At the 1988 Toronto Conference, the international work of scientists at the 1985 Villach and 1987 Villach/Bellagio meetings finally coalesced with a growing public demand for information and growing media attention. The effect of this nexus was to make it difficult for national leaders to avoid the issue.

Legitimacy and the Issue Domain

When the international arena, first in the form of the Brundtland Commission, began to seek a voice on the importance of climate change, Villach was the only *international* voice available on the subject, and it had a message that the international arena was ready to hear. This independent group of international scientists was able to make recommendations that their colleagues involved in prior, and even subsequent, national assessments were unable to make. As Frank Alcock (2001) observes: when assessments are presented by organizations (in this case, the U.S. government with an interest in limiting obligations to reduce CO_2 emissions), the assessment information may harmonize with the goals of the organization.

The absence of domestic political constraints on the conclusions reached by this body cannot be underestimated as a source of leeway in reaching policy conclusions. As with scientists participating in SCOPE work and other ICSU meetings (Greenaway 1996), the scientists attending the Villach conference attended in their personal capacities, not as

representatives of their governments. They were selected by the three partner agencies. If UNEP and WMO selected them, they were likely to be government scientists, or scientists on contract to government. If selected by ICSU, they were mostly academic scientists. Although they came to the conference from eighty-nine countries, chair James Bruce asked that they "shed their national policy perspectives" and to address the global issues in as comprehensive a way as possible. This admonition applied particularly to those scientists with governmental affiliations.

Participants in several assessments during the early 1980s observed that it was time for an international assessment. Bert Bolin (1994, 26) observed that "international assessment was necessary in order to establish the global importance of the issue." The 1986 SCOPE report noted that while "a number of assessments of [the possibility of climatic change] have been made by national groups, notably in the United States . . . the problem is clearly an international one and an assessment at the international level therefore seems desirable to serve as a basis for discussion and possibly, at some stage, for the development of an action plan" (SCOPE 1986, xv).

The task of this conference was not to assess the climate problem with a view to identifying policy actions that would be in the best interests of a particular country. Rather, the perspective was a global one. The conclusions reached by this conference were not accountable to national agencies, or legislative bodies that would be charged with implementing such conclusions. The mandate handed to the group came from two intergovernmental organizations (UNEP and WMO) and a nongovernmental organization (ICSU). As James Bruce noted, the call for policy recommendations was strongly made by the sponsoring agencies. Tolba urged the participants to recommend the establishment of an international coordinating committee on greenhouse gases, and to discuss in greater detail the options being placed before the world's leaders, encouraging a "wider debate on such issues as the costs and benefits of a radical shift away from fossil fuel consumption" (WMO 1986, 12). It was the hope of James Dooge, speaking on behalf of ICSU, that this conference would "provide a first approach to a sound foundation and appropriate guidelines for the development of the necessary policies at the national

and international level" (WMO 1986, 17). Indeed, the Villach conference made recommendations consonant with the goals of its organizational sponsors (continuing global climate research and policy advice for a global accord on the control of greenhouse gases).

However, by 1990, neither Villach nor the AGGG was cited for scientific information. The 1990 IPCC assessment soon became the primary source of scientific information for the international community as it contemplated a framework convention on climate change (Paterson 1996; Bodansky 1993; Agrawala 1997). The 1990 Second World Climate Conference referenced the IPCC report, not the Villach reports (Bodansky 1993, 469; Jäger and Ferguson 1990, 535). Declarations at the negotiations on a climate convention, which began in February 1991, identified the findings of the IPCC as evidence of the need for global attention to the matter of climatic change.

A history of the development of scientific consensus in the climate issue could highlight the role of scientists in international politics by noting the importance of the experts at Villach/Bellagio, and subsequently, the IPCC (see, for example, Paterson 1996; Lunde, cited in Paterson). Those who identify science and scientists as players in the development of international environmental policy might see the IPCC as a continuation of a story that features scientists as crucial contributors of information. It is, however, important to note the significant institutional shift, which highlights the importance of legitimacy as states began to participate in international negotiations at the highest level (see also Gupta, chapter 3, this volume).

The IPCC, established in 1988, was a new institution with a selection process and review mechanisms that were more legitimate to key actors as they began to negotiate an international agreement to limit human-induced changes to the global climate (Agrawala 1997).

Had the AGGG been subsumed by the IPCC? In fact, no. Further work of the AGGG was planned in November 1988. A four-volume report was issued in 1990. These volumes reflected the work of three working groups,[3] and were published just before the Second World Climate Conference in 1990. This group distinguished itself very clearly from the IPCC, noting that "the IPCC reports have been generated by an intergovernmental process. By contrast, the AGGG-related output appearing here is nongovernmental and produced by invited experts working in their private capacities" (Jäger 1990, 4). In addition, the funding for this endeavor was much smaller. Yet "despite these distinctions, both sets of Reports are not in any sense seen as 'competing' with each other. In fact the approach to the problem has been quite different in each case and in several instances, the same specialists have been involved in both studies" (Jäger 1990, 4). The first part of this observation suggests that the independent status of the AGGG is what distinguished it from the IPCC. The second part suggests that the specialists were the same. Both of these points merit consideration.

An essential feature of the design of the IPCC was that the panel would be constituted of nationally nominated scientists. This was a feature championed by the United States to remove the scientific momentum from the nongovernmental scientists, given the likelihood that intergovernmental negotiations on climate change would be initiated soon (Hecht and Tirpak 1995). Some of the attention Villach received stemmed from the fact that it had successfully approached the problem from a global and nongovernmental perspective, without regard to the interests of particular nations. As Agrawala observes, the AGGG did not have any "formal requirements for the group to report on its activities, or to seek direction from, even the governing bodies of the three sponsoring organizations, let alone national governments" (Agrawala 1997).

The observation that both the IPCC and the AGGG shared expert contributors would lend credence to the notion that states chose a governmental process of assessment over a nongovernmental one. In fact, several of the experts involved in scientific information provision during the 1980s became leaders of and contributors to the IPCC. However, not all participants in the pre-1988 communication of scientific information were incorporated into the IPCC process. Legitimacy, in the form of IPCC mechanisms, began to be important.

AGGG committee members included B. Bolin (Meteorological Institute in Sweden), W. C. Clark (Harvard University), W. Degefu (Ethiopia, National Meteorological Services Agency), H. Ferguson (AES, Environment Canada), G. Goodman (Stockholm Environment Institute, formerly the Beijer Institute), F. K. Hare (University of Toronto), J. Jäger (Germany), M. Oppenheimer (Environmental Defense Fund), C. C.

Wallen (WMO), and G. Woodwell (Woods Hole Research Center). Bolin's prominence in the IPCC is unmistakable; he was appointed its first chair. His presence in the IPCC might lead one to believe that the SCOPE/Villach/Bellagio scientists were incorporated into the IPCC process. This is not, however, an accurate perception. Of the AGGG steering committee members, only Bert Bolin and W. Degefu were contributors to the 1990 IPPC assessment, while Oppenheimer was a reviewer for Working Group I, the scientific assessment.

Those who funded and organized the Villach/Bellagio conferences, helped to communicate those conclusions, and provided background information and conclusions about targets and timetables in Toronto can also be connected to the AGGG in the 1990s, including Jäger, Goodman, and Oppenheimer. Moreover, the sponsors as well as the nongovernmental scientists that participated are nearly identical to those that organized and led initiatives from Villach and Bellagio. Sponsorship came from the Stockholm Environment Institute, the Environmental Defense Fund, and the Rockefeller Brothers Fund for all of these initiatives (Jäger 1990, i). Both Goodman and Oppenheimer became active participants in NGO initiatives once negotiations on a framework convention were underway. For this group, however, the international audience that was available prior to 1990 was largely unavailable.

Conclusion

Some have argued that the Villach assessment was a "catalytic event" that marked important developments in science (see Social Learning Group 2001, 269). As such, this assessment is an important one in this volume. Villach was an assessment process widely identified with great success in affecting policy outcomes. What contributed to its apparent success? This chapter has focused on the extent to which attributions of credibility, salience, and legitimacy contributed to the influence of the assessment. Central questions included: Did Villach represent a significant change in science, legitimacy, salience, or credibility? What factors independent of the assessment may have contributed to the vast distribution of its conclusions?

The chapter has argued that the scientific conclusions reached at Villach were not altogether novel, nor were they significantly more credible than those of previous assessments. Villach was not the first assessment to mention the role of other greenhouse gases in enhancing the greenhouse effect, though evidence for a greenhouse effect had mounted over the years. Indeed, the scientists used scientific conclusions about the contributions of greenhouse gases to press climate change onto the international arena, but the reasons for their influence had largely to do with the fact that the conclusions they generated resonated with developments in the international arena, including increased attention to environmental issues in general and ozone depletion in particular.

The assessment process did derive legitimacy from its international perspective, as well as from its nongovernmental status. The international arena needed an international messenger for the importance of addressing climate change. Villach findings informed the deliberations of the Toronto Conference and set the international agenda.

As climate change moved onto the international agenda, however, new actors in the issue domain began to make specific choices about the legitimacy of various assessment processes. While a scientific assessment process continued to inform international debate, the IPCC is a process that is distinct from Villach and the AGGG. Concerns about legitimacy have driven the careful crafting of a process of appointing scientists, reviewing reports, and producing policymaking summaries. The politicization of the issue brought concerns about legitimacy to the forefront.

This chapter's findings highlight the role that political developments can play in increasing issue salience. This suggests that even where it looks like spectacular scientific findings and novel approaches are influencing the agenda, factors unrelated to the attributes of the assessment can affect the influence these findings have.

Moreover, the chapter suggests that care should be taken in highlighting the role of scientists or assessments in the history of an issue domain. These processes, and the participants in them, change over time in important ways. Concerns about legitimacy drove states to seek advice from a very different assessment process once the issue was on the international agenda. The Villach group and the AGGG found their voices

diminished in the new issue domain where states were seeking information in the face of negotiations on a climate convention.

However, there is little doubt that the Villach assessment and the scientists that participated it in played a crucial role in developing an agenda for climate change. In 1987, Willliam Kellogg lamented that despite considerable increases in scientific knowledge and a scientific consensus that increases in atmospheric concentrations of CO_2 were warming the earth and that humans were to blame, "We have yet to see an important governmental or industrial decision that actually acknowledged the climate change factor" (p. 131).

Acknowledgment of the "climate change factor" was encouraged by a group of scientists who recognized connections between the problem of climate change and developments in the international arena. Within several months of Kellogg's lament new developments suggested that serious efforts would be made to reach international agreements on measures to protect the climate. Scientific concern had translated into myriad international declarations and movement toward policy action.

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Notes

1. I am grateful to Clark Miller for bringing Malone's 1984 testimony to my attention.

2. This conclusion is based on a list of contributors to hearings, communications, and reports for the Commission (World Commission on Environment and Development 1987, 366–387). None of the following people or organizations appear in the report: Villach, Villach Chair J. Bruce, Villach cochairs G. S. Golitsyn, R. Herrera, J. Rasmussun, editors of the SCOPE 29 report including B. Bolin, B. Doos, R. Warrick, J. Jäger, the Advisory Group on Greenhouse Gases, Michael Oppenheimer, and George Woodwell.

3. Analysis of Limitation Strategies, Indicators of Climatic Change, Performing Assessments of Adaptation and Limitation Strategies.

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