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RESEARCH ARTICLE

Scientific expertise in early international negotiations on climate change: Bert Bolin and the IPCC

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Abstract

This article examines the contributions of Bert Bolin, the first chair of the Intergovernmental Panel on Climate Change (IPCC), to the collective understanding of the panel's nature, operations and results, as well as his efforts to safeguard the credibility of the IPCC process in the face of criticism. Based on the scholarship on expertise and its relationship with the political process, I argue that Bolin's contribution to that process can be summarized in three points. First, he acted as a mediator between producers of climate change knowledge and its users, in this case governments and corporations. Second, he selected and emphasized some of the information provided by the IPCC and used it to advocate for immediate action to tackle climate change. Third, he played a major role in legitimizing the IPCC as the best possible assessment organization, especially through boundary work. Additionally, it is suggested that Bolin's role in the advisory process was not static but changed within an evolving political and social context. Through this case study, I aim to contribute to the scholarship that examines how environmental problems are defined and brought into the political arena, and the role of experts in this complex process.

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) as an advisory body tasked with assessing the available scientific knowledge on climate change. Widely regarded as the most authoritative and comprehensive assessment of this issue, the IPCC has played a crucial role in framing the global-warming debate.[1] Its role has been particularly relevant in major policy negotiations like the United Nations Framework Convention on Climate Change (UNFCCC), established during the Earth Summit in Rio de Janeiro in 1992, which entered into force in 1994.

In recognition of its contribution, the IPCC was awarded the Nobel Peace Prize on 10 December 2007. Bert Bolin, a Swedish physicist and the first chairman of the institution, was unable to attend the ceremony due to illness. However, Al Gore, the US vice president

[1] Mike Hulme, *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity*, Cambridge: Cambridge University Press, 2009; Kari de Pryck and Mike Hulme, *A Critical Assessment of the Intergovernmenal Panel on Climate Change*, Cambridge: Cambridge University Press, 2023; Eric Paglia and Charles Parker, 'The Intergovernmental Panel on Climate Change: guardian of climate science', in Arjen Boin, Lauren A. Fahy and Paul't Hart (eds.), *Guardians of Public Value: How Public Organisations Become and Remain Institutions*, Cham: Palgrave Macmillan, 2021, pp. 295–321; John Cook *et al.*, 'Consensus on consensus: a synthesis of consensus estimates on human-caused global warming', *Environmental Research Letters* (2016) 11(4), pp. 1–7.

and co-recipient of the prize, sent a private message to Bolin, acknowledging his crucial role in establishing the framework for the IPCC and expressing gratitude for his contributions: 'Without [you] we would not have come to where we are today'.[2] Three weeks later, Bert Bolin had passed away from stomach cancer, leaving behind a remarkable legacy as a climate expert and scientific adviser.

Bolin's contribution to the establishment and early success of the IPCC is generally recognized by both historians and his colleagues.[3] Widely regarded as one of the most respected climate scientists of all time, he has also been described as an exceptional coordinator and leader of international scientific collaborations.[4] However, as is common within the scientific community, when judging Bolin's authority, non-scientific criteria also played an important role.[5] According to those who worked with him, Bolin possessed several personal qualities, such as honesty, leadership and resilience, which made him one of the few climate scientists with sufficient political and diplomatic skills to persuade the world to tackle the climate issue.[6] Even more importantly, Bolin had the capacity to be perceived as remaining distanced from controversies. Despite being the chairman of the IPCC, an organization fiercely criticized by the denial movement, Bert Bolin has not been the object of significant reproach, and his reputation has remained intact. As claimed by his colleague at the IPCC, Pier Vellinga, 'Bolin was beyond all criticism'.[7] But how he gained such authority among his scientific peers, and the specifics of his relevance as chairman of the IPCC, have remained obscure in the literature. Moreover, while the IPCC has been researched extensively as an institution, little is known about the individuals who created and shaped the organization.[8] In a context where individual expertise was becoming less valued and increasingly replaced by large international organizations such as the IPCC, what role remained for independent experts? Was there still a place for individual agencies within such a complex and emerging network?

[2] Dennis Hevesi, 'Bert Bolin, 82, is dead; led U.N. climate panel', *New York Times*, 4 January 2008, at www.nytimes.com/2008/01/04/obituaries/04bolin.html (accessed 21 June 2023).

[3] Stefan C. Aykut and Amy Dahan, *Gouverner le climat? Vingt ans de négociations internationales*, Paris: Les Presses de Sciences Po, 2015; Shardul Agrawala, 'Context and early origins of the Intergovernmental Panel on Climate Change', *Climatic Change* (1998) 39, pp. 605–20; Shardul Agrawala, 'Structural and process history of the Intergovernmental Panel on Climate Change', *Climatic Change* (1998) 39, pp. 621–42; John Houghton, 'National life stories. An oral history of British science. Professor Sir John Houghton. Interviewed by Dr. Paul Merchant', 2011; Stephen H. Schneider, *Science as a Contact Sport: Inside the Battle to Save Earth's Climate*, Washington, DC: National Geographic Society, 2009; Spencer R. Weart, *The Discovery of Global Warming*, Cambridge, MA: Harvard University Press, 2003; Henning Rodhe, 'Bert Bolin (1925–2007), a world leading climate scientist and science organiser', *Tellus* (2013) 65(1), Series B, Chemical and Physical Meteorology, pp. 1–6; Robert Watson, 'Interview with Robert Watson, AIP Oral History, by Keynyn Brysse' (2009).

[4] John Houghton, *In the Eye of the Storm: The Autobiography of Sir John Houghton*, Oxford: Lion Books, 2013, p. 127; Rodhe, op. cit. (3).

[5] Harry Collins, *Changing Order: Replication and Induction in Scientific Practice*, Beverly Hills: Sage, 1985.

[6] John Houghton, 'Interview with Sir John Hougton', in Frank Raes (ed.), *Conversations about Molecules and Planets, with Humans in Between*, Joint Research Centre, 2012; Houghton, op. cit. (4); Michael Oppenheimer, interview with the author, 27 March 2023; Bob Watson, 'Bert Bolin (1925–2008)' *Nature* (2008) 571 (7179), p. 642.

[7] Pier Vellinga, interview with the author, 28 June 2023.

[8] I express my gratitude to reviewer 1 for suggesting that I place greater emphasis on this specific novelty and for providing insightful exceptions in this gap: Esteve Corbera, Laura Calvet-Mir, Hannah Hughes *et al.*, 'Patterns of authorship in the IPCC Working Group III report', *Nature Climate Change* (2016) 6(1), pp. 94–9; Hannah Rachel Hughes and Matthew Paterson, 'Narrowing the climate field: the symbolic power of authors in the IPCC's assessment of mitigation', *Review of Policy Research* (2017) 34(6), pp. 744–66; Tommaso Venturini, Kari de Pryck and Robert Ackland, 'Bridging in network organisations: the case of the Intergovernmental Panel on Climate Change (IPCC)', *Social Networks* (2022) 75, pp. 137–47; Kari de Pryck and Adèle Gaveau, 'Scientists in multilateral diplomacy: the case of the members of the IPCC Bureau, *Political Anthropological Research on International Social Sciences (PARISS)* (2023) 4(1), pp. 2590–3284.

This article explores the tension between individual actors, each with their own agendas, and the broader institutional frameworks in which international relations and diplomacy play a crucial role. My research is guided by the following questions: in what ways was Bert Bolin important for the establishment and success of the IPCC? What role did he play as an expert in the political process toward a climate change convention? How did he contribute to the collective perception of what the IPCC was and how it worked? In what ways did he protect the IPCC process and himself from criticism? Drawing on a range of primary sources, including correspondence, speeches, conferences and published literature, I seek to reconstruct the specific strategies employed by Bert Bolin to persuade relevant stakeholders to heed the institution's conclusions and convince them of the necessity for a convention. More specifically, the article focuses on the period between 1988 and 1994, from the establishment of the IPCC to the moment the UNFCCC entered into force. This time frame is of particular significance because it coincided – not by chance, as will be argued – with the emergence of the denial movement within public discourse. In the face of growing criticism, establishing climate scientists' credibility in an international context necessitated not only advancing scientific knowledge but also establishing institutional authority within global governance.[9] As this chapter shows, one crucial feature of Bolin is that he learnt how to adapt his actions and discourses, and thus his contribution as a climate expert, to align with those two different contexts.

The first section of the article briefly introduces a theoretical framework on expertise. I argue that three specific tasks of expertise are especially relevant to understanding Bolin's contribution in this period. First, experts act as mediators between producers of knowledge and its users. Second, experts can frame problems and their possible solutions by selecting and emphasizing the information provided. Third, especially when working in international assessment panels, experts play a major role in establishing clear boundaries between the scientific and the political processes. The second section introduces Bert Bolin and his career, focusing on how he became an expert in climate science. Here, I also trace his involvement in large international research groups and early environmental assessment. The section concludes with a brief description of how these experiences led him to become the chairman of the IPCC and how this appointment granted him the privileged position of acting as the public spokesperson for the organization. In the third section, I explore the period from 1988 to 1991, characterized by the rise of awareness of the climate change issue and a strong political momentum and will to tackle the problem following the ozone depletion process.[10] At that time, the panel was supposed to provide the base and guidance for the international negotiations of the UNFCCC. With this goal in mind, Bolin exerted significant influence within the IPCC in determining how the institution should tailor its knowledge to policymakers, particularly in the summaries for policymakers (SPMs), concise texts that presented the panel's policy-relevant results. He also played a crucial role in framing the political debate by actively presenting the IPCC's findings to both politicians and the energy sector and advocating immediate action to mitigate climate change. The last section looks further at the period that unfolded after the initiation of UNFCCC negotiations. This event amplified the political pressure and catalysed the rise of climate change denial movements and their fierce criticisms of the IPCC. In this context, the legitimacy of the greenhouse issue could easily be lost if the scientists involved in the panel

[9] Marybeth Long Martello and Sheila Jasanoff, 'Introduction: globalization and environmental governance', in Sheila Jasanoff and Marybeth Long Martello (eds.), *Earthly Politics: Local and Global in Environmental Governance*, Cambridge, MA: MIT Press, 2004, pp. 1–29.

[10] Daniel Bodansky, 'The history of the global climate change regime', in Urs Luterbacher and Detlef F. Sprintz (eds.), *International Relations and Global Climate Change*, Cambridge, MA: MIT Press, 2001, pp. 23–40.

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were accused of advocating for particular political actions. For that reason, Bolin adopted several protection strategies to enhance the IPCC's authority, credibility and countercriticism. These strategies included not only presenting the panel's results as credible, objective and balanced, but also underscoring their strictly scientific nature. He presented clear distinctions between scientific assessment and political negotiations, and refrained from providing policy recommendations. I show that it was during this period that the IPCC was defined as an organization that provides policy-relevant knowledge without being prescriptive, adopting instead a 'linear model of expertise'.[11] This model suggests that science offers objective facts to policymakers, who should base their decisions on this knowledge and on their political values.[12]

Through this case study, I seek to provide new insights into the existing scholarship that explores the relationship between expertise and policymaking around boundary institutions like the IPCC.[13] Concretely, I intend to expand upon the body of literature that explores the role of experts and expert knowledge in decision making, particularly in the context of environmental issues and climate change.[14]

Expertise in the context of international environmental assessments

Knowledge holds significant value today, emerging as the foundation and guiding principle through which political decisions are generally justified.[15] Consequently, the number and roles of experts are rapidly proliferating, prompting scholarly endeavours to understand their nature and functions. In this section, I will provide a concise overview of theoretical analyses of expertise that shed light on my case study.

The definition of an 'expert' typically revolves around an individual possessing specialized knowledge, and it is often used interchangeably with the term 'specialist'.[16] Therefore expertise is frequently associated with specific knowledge and abilities that the expert is presumed to possess.[17] Besides technical skills or knowledge, an expert is also expected

[11] Aykut and Dahan, op. cit. (3); Clark Miller, 'Climate science and the making of a global political order', in Sheila Jasanoff (ed.), *States of Knowledge: The Co-production of Science and Social Order*, London: Routledge, 2004, pp. 46–66; Philippe Roqueplo, *Entre savoir et décision: L'expertise scientifique*, Paris: Editions Quæ, 1997.

[12] Amy Dahan and Hélène Guillemot, 'Les relations entre science et politique dans le régime climatique: A la recherche d'un nouveau modèle d'expertise?', *Natures sciences sociétés* (2015) 23, pp. S6–S18, S9.

[13] Clark Miller, 'Hybrid management: boundary organizations, science policy, and environmental governance in the climate regime,' *Science, Technology, & Human Values* (2001) 26(4), pp. 478–500; Karin M. Gustafsson and Rolf Lidskog, 'Boundary organizations and environmental governance: performance, institutional design, and conceptual development', *Climate Risk Management* (2018) 19, pp. 1–11; David H. Guston, 'Boundary organizations in environmental policy and science: an introduction', *Science, Technology & Human Values* (2001) 26(4), pp. 399–408.

[14] Clark A. Miller and Paul N. Edwards, 'Introduction: the globalization of climate science and climate politics', in Miller and Edwards (eds.), *Changing the Atmosphere: Expert Knowledge and Environmental Governance*, Cambridge, MA: MIT Press, 2001, pp. 1–30; Reiner Grundmann, 'Transnational policy networks and the role of advocacy scientists: from ozone layer protection to climate change', in Frank Biermann, Rainer Brohm and Klaus Dingwerth (eds.), *Proceedings of the 2001 Berlin Conference on the Human Dimensions of Global Environmental Change 'Global Environmental Change and the Nation State'*, Potsdam Institute for Climate Impact Research, 2002, pp. 405–14; Peter M. Haas, 'Introduction: epistemic communities and international policy coordination', *International Organization* (1992) 46, pp. 1–35.

[15] Daniel Bell, *The Coming of Post-industrial Society: A Venture in Social Forecasting*, New York: Basic Books, 1973; Reiner Grundmann and Nico Stehr, 'Social control and knowledge in democratic societies', *Science and Public Policy* (2003) 30(3), pp. 183–8.

[16] Reiner Grundmann, 'The problem of expertise in knowledge societies', *Minerva* (2017) 55(1), pp. 25–48, 26.

[17] Peter Dear, 'Mysteries of state, mysteries of nature: authority, knowledge and expertise in the seventeenth century', in Jasanoff, op. cit. (11), pp. 206–24; Harry Collins and Robert Evans, *Rethinking Expertise*, Chicago: University of Chicago Press, 2007.

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to embody virtues and moral values such as honesty, impartiality or disinterest.[18] While understanding the characteristics of what makes an expert is crucial, it is incomplete without considering its relational aspects, as expertise is fundamentally delivered at the behest of others who seek it.[19] Consequently, it is vital not only to focus on what experts *are* but also to explore what they *do*. In other words, comprehending the role of experts in society necessitates a focus on their actions and discourses besides their specific knowledge.

Various authors have attempted to categorize different types of expert and how they interact with the policymaking process.[20] However, I find these categorizations to be rigid and less useful when analysing historical case studies, as they fail to capture the dynamic nature of experts' work in action. This article shows that experts do not adhere to a fixed approach when engaging with policymaking. On the contrary, they adapt to the context and modify their actions and discourses based on what they perceive to be most beneficial for their objectives. Specifically, I will focus on three distinct tasks that experts undertake when operating in the intricate science–policy interface that are particularly relevant to my case study.

First, acting as mediators between the producers of knowledge and the users of that knowledge, they bridge the gap between those who generate the capacity to act and those responsible for taking action.[21] The institutionalization of this process has been achieved through the establishment of assessments, which can be defined as 'formal efforts to assemble selected knowledge with a view to making it publicly available in a form intended to be useful for decision-making'.[22] Different historical works on environmental assessments show that the way these assessments were implemented, as well as the mechanisms governing science–policy interactions, was often shaped by a relatively small group of scientists.[23] These international experts, who facilitated the circulation of knowledge across sectors and between national and international levels, played a crucial role in framing specific environmental regulation and governance stances.[24]

Translating knowledge into possible action is, then, an active process; it is paramount for experts to select, determine and organize knowledge to be presented to diverse audiences.[25] However, it is important not to view them naively as mere conveyors of knowledge, since this process is never politically neutral. As Hilgartner states, experts 'often simplify science with an eye toward persuading their audience to support their goals … [such as]

[18] Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation*, Chicago: University of Chicago Press, 2008; Stephen Turner, 'What is the problem with experts?', *Social Studies of Science* (2001) 31(1), pp. 123–49; Harry Collins, *Are We All Scientific Experts Now?*, Cambidge: Polity Press, 2014.

[19] Grundmann, op. cit. (16), p. 26.

[20] Turner, op. cit. (18); Roger A. Pielke, *The Honest Broker*, Cambridge, Cambridge University Press, 2007; Robert Hoppe, 'Scientific advice and public policy: expert advisers' and policymakers' discourses on boundary work', *Poiesis & Praxis* (2009) 6(3), pp. 235–63.

[21] Nico Stehr and Reiner Grundmann, *Experts: The Knowledge and Power of Expertise*, New York: Routledge, 2011, p. 40.

[22] William C. Clark, Ronald B. Mitchell and David W. Cash, 'Evaluating the influence of global environmental assessments', in Ronald B. Mitchell *et al.* (eds.), *Global Environmental Assessments: Information and Influence*, Cambridge, MA: MIT Press, 2006, pp. 1–28, 3.

[23] Nathalie Jas, 'Adapting to "reality": the emergence of an international expertise on food additives and contamination in the 1950s and early 1960s', in Soraya Boudia and Nathalie Jas (eds.), *Toxicants, Health and Regulation since 1945*, London: Pickering & Chatto, 2013, pp. 47–69; Michael Oppenheimer, Naomi Oreskes, Dale Jamieson, Keynyn Brysse, Jessica O'Reilly, Matthew Shindell and Milena Wazeck, *Discerning Experts: The Practices of Scientific Assessment for Environmental Policy*, Chicago: University of Chicago Press, 2019.

[24] For instance, related to the regulation of toxic substances, see Soraya Boudia and Nathalie Jas (eds.), *Toxicants, Health and Regulation since 1945*, London: Pickering & Chatto, 2013; Soraya Boudia and Nathalie Jas, *Powerless Science? Science and Politics in a Toxic World*, New York: Berghahn Books, 2014.

[25] Stehr and Grundman, op. cit. (21), pp. 4, 12.

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advocate positions in science-intensive policy controversies'.[26] This brings us to a second role of expertise: framing problems and setting priorities for action. Many authors have discussed the active role of certain scientific communities in setting the climate change agenda, especially in the second half of the 1980s.[27] This prominent role in presenting the climate change problem in the public sphere has given climate scientists the power to determine both the approach taken to address the issue and what constitutes sensible solutions to it. In essence, by emphasizing certain points and selecting which knowledge to share, experts define and interpret the situation, giving priority and legitimacy to specific problem-solving approaches.[28]

Yet, in moments of heightened political pressure surrounding a scientific issue, experts advocating specific measures may find their authority at stake. In the middle of the climate change controversy, the legitimacy of the greenhouse issue could be undermined as the role of the scientist as a policy advocate emerges.[29] Experts who clearly supported the implementation of drastic measures feared being accused of deviating from the Mertonian norms of 'disinterestedness', 'objectivity' and 'value neutrality', thereby eroding their authority and credibility.[30] For this reason, especially when their competence is under attack, experts undertake a third important role: establishing a clear demarcation between their activities and the political process to guarantee the integrity of their work.[31]

The attribution of specific characteristics to scientific institutions to create a social boundary that distinguishes science from other activities is known as 'boundary work'.[32] These practices are a common strategy in advisory committees and assessment panels, serving various purposes. First, they preserve their authority and credibility in the public sphere, safeguarding the autonomy of scientific work from political interference.[33] This is important since preserving the scientific credibility and legitimacy of an assessment is vital for its influence in the political realm.[34] Through boundary work, scientists also determine who belongs to their community and, consequently, who can enter relevant networks of authority, especially in areas with substantial uncertainty.[35]

[26] Stephen Hilgartner, 'The dominant view of popularization: conceptual problems, political uses', *Social Studies of Science* (1990) 20, pp. 519–39, 531.

[27] Helen Ingram, H. Brinton Milward and Wendy Laird, 'Scientists and agenda setting: advocacy and global warming', in Marvin Waterstone (ed.), *Risk and Society: The Interaction of Science, Technology and Public Policy*, Dordrecht: Springer Netherlands 1992, pp. 33–52; Haas, op. cit. (14); Wendy E. Torrance, 'Science or salience: building an agenda for climate change', in Mitchell *et al.*, op. cit. (22), pp. 29–56.

[28] Aykut and Dahan, op. cit. (3); Oppenheimer *et al.*, op. cit. (23); De Pryck and Hulme, op. cit. (1); Stehr and Grundman, op. cit. (21); Nina Wormbs and Sverker Sörlin, 'Arctic futures: agency and assessing assessments', in Lill-Ann Körber, Scott MacKenzie, Anna Westerstähl Stenport (eds.), *Artic Environmental Modernities*, Cham: Springer International Publishing, 2017, pp. 247–61.

[29] Ingram, Brinton Milward and Laird, op. cit. (27), p. 52.

[30] Keynyn Brysse, Naomi Oreskes, Jessica O'Reilly *et al.*, 'Climate change prediction: erring on the side of least drama?', *Global Environmental Change* (2013) 23(1), pp. 327–37; Ingram, Brinton Milward and Laird, op. cit. (27); Sheila S. Jasanoff, 'Contested boundaries in policy-relevant science', *Social Studies of Science* (1987) 17(2), pp. 195–230; Oppenheimer *et al.*, op. cit. (23).

[31] Robert Hoppe, 'From "knowledge use" towards "boundary work": sketch of an emerging new agenda for inquiry into science–policy interaction', in Roeland J. Veld (ed.), *Knowledge Democracy: Consequences for Science, Politics, and Media*, Berlin and Heidelberg: Springer, 2010, pp. 169–86.

[32] Thomas F. Gieryn, 'Boundary-work and the demarcation of science from non-science: strains and interests in professional ideologies of scientists', *American Sociological Review* (1983) 48(6), pp. 781–95, 782.

[33] Gieryn, op. cit. (32); Jasanoff, op. cit. (30); Aykut and Dahan, op. cit. (3); Dahan and Guillemot, op. cit. (12); Oppenheimer *et al.*, op. cit. (23).

[34] William C. Clark, Ronald B. Mitchell and David W. Cash, 'Evaluating the influence of global environmental assessments', in Mitchell *et al.*, op. cit. (22), pp. 1–28.

[35] Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers*, Cambridge, MA and London: Harvard University Press, 1990, p. 14.

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In the specific context of advisory and assessment processes, boundary work is the base of what has been commonly referred to as the 'linear model of expertise'. This model, often criticized in the literature for its unrealistic nature, aims to explain the relation that assessment institutions establish with the policymaking process.[36] While the linear model is highly theoretical and almost never applied in practice, its extensive use as a rhetorical tool merits close attention. According to this framework, experts focus on providing factual information, while politicians engage in value-based discussions. Furthermore, the model suggests that scientific knowledge should precede political action, aligning with the widely held notion that 'science speaks truth to power'.[37] Since the knowledge provided by scientists is supposed to be objective, unbiased and adequate, the model assumes that it will necessarily lead to a better understanding of the problem and, consequently, to the formulation of effective policies.[38] Thus the model does not claim that science and politics do not interact; instead, boundary work serves to simultaneously demarcate and coordinate science and policy.[39] In the case of the IPCC, this idea is summarized in the often quoted statement that can be found on its website: 'The work of the organisation is policy-relevant and yet policy-neutral, never policy-prescriptive'.[40] The dual role of international organizations like the IPCC – as both political institutions and expert bodies – raises important questions about their engagement in boundary work, warranting further exploration.[41]

In the remainder of this article, I will show how these various roles of expertise manifest themselves in practice and how their relative importance varies with external factors such as the political and social context.

Bert Bolin and the setting up of the Intergovernmental Panel on Climate Change

Bert Bolin assumed the position of chairman of the IPCC at the age of sixty-three, at the apogee of a solid scientific career. He had been a prominent member of the Meteorology Department at the University of Stockholm and its permanent chair since the early 1960s. In 1957, following the unexpected passing of his mentor Carl-Gustaf Rossby, Bolin assumed the leadership of the International Meteorological Institute, based at Stockholm University. Rossby was a pivotal figure in the emergence and evolution of modern meteorology, with extensive connections in both the United States and Europe, making him exceptionally well networked internationally.[42] From Rossby, Bolin inherited not only a visionary interest in the role of carbon dioxide in altering the Earth's climate but also a rich legacy of international and first-hand knowledge in navigating and directing large projects with significant

[36] Arthur Edwards, 'Scientific expertise and policy-making: the intermediary role of the public sphere', *Science and Public Policy* (1999) 26(3), pp. 163–70; Jasanoff, op. cit. (30).

[37] David Collingridge and Colin Reeve, *Science Speaks to Power: The Role of Experts in Policy Making*, New York: St Martin's Press, 1986.

[38] Mike Hulme, *Exploring Climate Change through Science and in Society*, London and New York: Routledge, 2013; Daniel Sarewitz, 'Does climate change knowledge really matter?' *WIREs Climate Change* (2011) 2(4), pp. 475–81.

[39] Hoppe, op. cit. (31), p. 169.

[40] 'IPCC – Intergovernmental Panel on Climate Change', at https://archive.ipcc.ch/organization/organization.shtml (accessed 12 July 2023).

[41] For more on environmental international organizations and this ambiguous role see Wolfram Kaiser and Jan-Henrik Meyer, *International Organizations and Environmental Protection: Conservation and Globalization in the Twentieth Century*, New York and Oxford: Berghahn Books, 2016; Perrin Selcer, *The Postwar Origins of the Global Environment: How the United Nations Built Spaceship Earth*, New York: Columbia University Press, 2018.

[42] James Rodger Fleming, *Inventing Atmospheric Science: Bjerknes, Rossby, Wexler, and the Foundations of Modern Meteorology*, Cambridge, MA and London: MIT Press, 2016.

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political dimensions, particularly during the Cold War era.[43] This network would become essential in his career as a prolific science organizer.[44]

Bolin garnered recognition for his extensive research on carbon cycles and man-made pollutants. His research, especially on the changes in the carbon dioxide content of the atmosphere and sea due to fossil fuels, significantly contributed to the understanding of the ocean's role in global warming.[45] Moreover, his work played a crucial role in fostering environmental awareness at a time when human activities were increasingly perceived as a threat to the global environment.[46] Throughout the 1960s and 1970s, Bolin collaborated with top international scientists to collect data on carbon dioxide variations in the atmosphere and other substances that produce environmental pollution.[47] Additionally, he developed models to analyse the response of the oceans to carbon dioxide emissions from fossil fuels and examined the impact of changes in land biota on carbon cycles.[48]

In the post-Second World War era, climate science became an expanding and increasingly complex discipline, especially after the International Geophysical Year in 1957–8. Thus global collaborative efforts to address shared research challenges became crucial. The Swedish scientists played a pivotal role in coordinating international scientific cooperation, displaying exceptional skills in what scholars have termed 'diplomacy for science'.[49] One example of Bolin's involvement in such endeavours was his instrumental contribution to the creation of the Global Atmospheric Research Programme (GARP). GARP aimed to enhance the understanding of the global weather system to improve climate and weather predictions. His effective communication skills, diplomatic but firm style and amicable personality were vital to the success of GARP.[50] The establishment of GARP facilitated comprehension of the relationship between human-induced emissions of greenhouse gases and the global climate and served to create an infrastructure of climate knowledge.[51]

In parallel, during the 1970s, significant concerns regarding climate disruption arose and prompted some institutions to undertake assessments that further analysed the chemical

[43] Eric Paglia and Sverker Sörlin, 'Greening our common fate: Stockholm as a node of global environmental memory', in Glenda Sluga, Kate Darian-Smith and Madeleine Herren-Oesch (eds.), *Sites of International Memory*, Philadelphia, University of Pennsylvania Press, 2023, pp. 237–65.

[44] Paglia and Sörlin, op. cit. (43). I thank reviewer 2 for suggesting enhancing the connection between Bolin and Rossby's network.

[45] Bert Bolin and Erik Eriksson, 'Changes in the carbon dioxide content of the atmosphere and sea due to fossil fuel combustion. The atmosphere and the sea in motion. Scientific contribution to the Rossby memorial volume', in Bert Bolin (ed.), *The Atmosphere and the Sea in Motion: Scientific Contribution to the Rossby Memorial Volume*, New York: Rockefeller Institute Press, 1959, pp. 130–42.

[46] Yannick Mahrane *et al.*, 'From nature to biosphere: the political invention of the global environment, 1945–1972', *Vingtième siècle: Revue d'histoire* (2012) 113(1), pp. 127–41.

[47] Bert Bolin and Charles David Keeling, 'Large-scale atmospheric mixing as deduced from the seasonal and meridional variations of carbon dioxide', *Journal of Geophysical Research* (1963) 68(13), pp. 3899–920; Bert Bolin, Lennart Granat, Lars Ingelstam *et al.*, *Air Pollution across National Boundaries: The Impact on the Environment of Sulfur in Air and Precipitation. Sweden's Case Study for the United Nations Conference on the Human Environment*, Stochkolm: Royal Ministry for Foreign Affairs and Royal Ministry of Agriculture, 1971.

[48] Bert Bolin, 'Changes of land biota and their importance for the carbon cycle', *Science* (1977) 196, pp. 613–15.

[49] Llyod S. Davis and Robert G. Patman, *Science Diplomacy: New Day or False Dawn?*, Singapore: World Scientific Publishing Co., 2015. For more on the role of Swedish scientists in environmental sciences and governance see Sverker Sörlin and Eric Paglia, *Stockholm and the Rise of Global Environmental Governance: The Human Environment*, Cambridge: Cambridge University Press, 2024.

[50] Spencer R. Weart, 'The evolution of international cooperation in climate science', *Journal of International Organization Studies* (2012) 3(1), pp. 41–59; Matthias Heymann, 'Science diplomacy and politics: building the global atmospheric research program', *BJHS*, this issue.

[51] Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data and the Politics of Global Warming*, Cambridge, MA: MIT Press, 2010, p. 242.

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composition of the atmosphere and the consequences of its changes. Bolin actively collaborated in several of them, gaining extensive experience coordinating national and international reports. This included involvement in the pioneering assessments on acid rain and early national assessments on climate change.[52] In these collaborations, he demonstrated to colleagues, governments and international organizations his ability to see the big picture and synthesize scientific knowledge.[53] Additionally, his experience as a scientific adviser to the Swedish government in the 1980s gave him a comprehensive understanding of the political challenges associated with global warming, making him exceptionally well suited to guide the first international assessments on climate change.

In the 1980s, the Scientific Committee on Problems of the Environment (SCOPE) – under the auspices of the International Council of Scientific Unions (ICSU) – engaged in assessing the wider ecological and socio-economic impacts of climate change. These assessments, which involved international scholars like Bolin, helped establish an international network of scientists concerned about climate change. However, while scientists encouraged governments to consider their findings in future energy decisions, the assessments' conclusions primarily recommended further research.

Contrary to the previous approach, a shift occurred with the release of the subsequent SCOPE report in 1986, led by Bolin and organized through his extensive network. The report, titled *Greenhouse Effect, Climatic Change and Ecosystems* served to consolidate existing knowledge on the issue and bring it to the forefront of the political arena. The report was the basis for the Villach conference, held in October 1985, which marked a significant turning point in the history of the politicization of climate change.[54] The meeting concluded that 'the problem of a possibly changing climate due to the emissions of greenhouse gases should be considered as one of today's most important long-term environmental problems' and called for preventive action.[55] It was during this conference that the proposal for the establishment of an international advisory panel and coordinating committee on greenhouse gases was introduced, to provide governments with possible responses to potential global warming.

Discussions surrounding the establishment of the IPCC involved the UNEP, the WMO, and some countries, notably the United States.[56] In 1988, the organization was officially established and endorsed by UN General Assembly. In its inaugural meeting, the panel agreed upon three primary tasks, each to be coordinated by a working group (WG). Working Group I (WGI) would prepare an assessment of available scientific information on climate change; WGII would evaluate the environmental and socio-economic impacts of such change, and WGIII would be tasked with formulating response strategies. Bert Bolin was unanimously elected chair of the institution.[57] As John Houghton, chair of WGI, stated, everybody believed the Swedish scientists should take the chairing of the IPCC.[58] He played

[52] Bolin *et al.*, op. cit. (47); National Research Council, *Carbon Dioxide and Climate: A Scientific Assessment. Report of an Ad Hoc Study Group on Carbon Dioxide and Climate*, National Academy of Sciences, 1979.

[53] Rodhe, op. cit. (3).

[54] Weart, op. cit. (50); David G. Hirst, 'Controlling the agenda: science, policy and the making of the Intergovernmental Panel on Climate Change', in Wolfram Kaiser and Jan-Henrik Meyer (eds.), *International Organizations and Environmental Protection: Conservation and Globalization in the Twentieth Century*, New York and Oxford: Berghahn Books, 2017, pp. 293–316, 301.

[55] WMO, *Report of the International Conference on the Assessment of the Role of Carbon Dioxide and of Other Greenhouse Gases in Climate Variations and Associated Impacts, Villach, Austria, 9–15 October 1985*, World Climate Programme, 1986, p. 23.

[56] Agrawala, op. cit. (3).

[57] IPCC, *Report of the First Session of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) (Geneva, 9–11 November)*, World Climate Programme Publications Series, 1988.

[58] Interview with Houghton, op. cit. (3), p. 182.

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a crucial leadership role in the processes leading to the formation of the IPCC, and due to his long career and measured approach, he was trusted by scientists and politicians alike. This made him the obvious choice for the role. Furthermore, his base in Sweden – a key hub for environmental research and governance – and the country's perceived neutrality at the end of the Cold War may have also influenced the decision.[59] This can be understood as a strategic diplomatic move by the IPCC's parent institutions.[60]

Bolin exemplified the characteristics of a versatile scientist, possessing both 'contributory expertise' and 'intersectional expertise', which meant that he actively contributed to various areas of climate science while demonstrating an understanding of and ability to engage with other scientific areas away from his own domain.[61] Using Collins's concept, we could say that Bolin was in the 'core set' of climate researchers; that is, he was one of the most influential researchers in this community and was connected by multiple networks with prestigious institutions.[62] Such alliances in the worldwide community of climate scientists were also a key factor in his election as chair of the emergent IPCC.

Bolin's official responsibilities as chair encompassed two main aspects: organizing and coordinating the three working groups and reporting on IPCC activities to the governing bodies of the WMO and the UNEP.[63] Nevertheless, as will be further discussed in the rest of this article, Bolin's most significant role was to serve as the spokesperson and public face of the institution. He played a crucial role in presenting the IPCC's methodologies and findings and drawing conclusions based on them.

Despite the IPCC's first mandate being to provide guidelines for the establishment of a global convention on climate change, various political and diplomatic pressures resulted in the creation of an apparatus under the auspices of the UN General Assembly, the Intergovernmental Negotiating Committee (INC), to hold the political process.[64] The creation of this body in December 1990 formalized the fact that the IPCC would not have an active role in the climate convention negotiations. From then on, the relationship between the panel and the policymaking process was theoretically clear: the IPCC was expected to carry out the necessary work to support the negotiations, providing 'objective scientific and technical advice', cooperating with the INC and responding to its needs and requests during the negotiating process, but nothing more than that.[65] Nonetheless, Bolin's stature and personal connections within the INC, particularly with its chair, Jean Ripert, ensured that his voice would be carefully considered. In representation of the IPCC, Bolin delivered periodic presentations at INC meetings, and as climate negotiator Bo Kjellén acknowledged, when Bolin presented the assessment findings, that 'there was a silence in the room'.[66]

The results of these negotiations came in June 1992, when the UNFCCC was established at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, also known as the Earth Summit, and entered into force two years later, in 1994. The key point of the convention was Article 2, which called for international cooperation to 'stabilize greenhouse gas concentration in the atmosphere at a level that will

[59] Sörlin and Paglia, op. cit. (49).

[60] I appreciate reviewer 3 for highlighting this important issue.

[61] Collins, op. cit. (18), p. 14.

[62] Collins, op. cit. (5).

[63] IPCC, op. cit. (57), Annex VI.

[64] Bodansky, op. cit. (10).

[65] IPCC, *Report of the Fifth Session of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) (Geneva, 13–15 March)*, World Climate Programme Publications Series, 199, p. 2.

[66] Bo Kjellén, 'Foreword', in Bert Bolin, *A History of the Science and Politics of Climate Change: The Role of the Intergovernmental Panel on Climate Change*, Cambridge: Cambridge University Press, 2007, pp. ix–x.

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prevent dangerous anthropogenic interference with the climate system', although specific reduction targets were not established.[67]

Political awareness (1988–1992)

As discussed above, Bert Bolin had previously been involved in other climate change assessment processes, but had expressed dissatisfaction with its lack of financial resources and influence.[68] Thus, when asked to chair the IPCC, he saw it as a 'tempting opportunity' because he believed that this organization finally had the necessary structure to make a significant impact.[69]

The distinguishing feature of the IPCC was its intergovernmental nature. Unlike previous assessment bodies, the IPCC's membership consisted of states rather than individual scientists. This meant that IPCC participants served as experts and representatives of their respective governments rather than as independent agents. On the one hand, some argue that the creation of an intergovernmental body was intended to undermine the impact of assessment results by exerting control, delaying processes or marginalizing more activist actors.[70] On the other hand, scientists involved in the IPCC, including its chair, believed that the intergovernmental status of the institution was a brilliant move that would provide the panel with political influence. They saw it as a powerful and direct means of communication between governments and the scientific community, ensuring that the IPCC was regarded as the primary source of information.[71] In any case, there is a consensus that the intergovernmental status of the IPCC had significant implications for its operations and diplomatic influence.[72] Nevertheless, having a direct communication channel with governments was not enough to convince them to address the issue of climate change. Developing new approaches to the interaction between science and politics was considered crucial.[73]

Creating proper communication channels with politicians

To adapt scientific knowledge to policymakers, the IPCC decided that the three comprehensive reports produced by each working group would be accompanied by a twenty-page policy document condensing the key findings, particularly information that was most valuable to governments. This document was called the summary for policymakers (SPM).

As chairman of the IPCC, Bolin took responsibility for producing the SPMs and the overviews – texts that integrated the knowledge from the summaries of the three working groups and would be available to the public. Bolin emphasized the need for these texts to clearly extract the technical information that was particularly useful for policy

[67] United Nations, 'United Nations Framework Convention on Climate Change', at https://unfccc.int/resource/docs/convkp/conveng.pdf (accessed 28 July 2023).

[68] Shardul Agrawala, 'Early science–policy interactions in climate change: lessons from the Advisory Group on Greenhouse Gases', *Global Environmental Change* (1999) 9, pp. 157–69; Bolin, op. cit. (66).

[69] Bolin, op. cit. (66).

[70] Agrawala, op. cit. (3); Peter M. Haas and Casey Stevens, 'Organized science, usable knowledge, and multilateral environmental governance', in Rolf Lindskog and Göran Sundqvist, *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction*, Cambridge, MA: MIT Press, 2011, pp. 125–61; William A. Nitze, 'Letter to Dr. Michael Oppenheimer', 4 April 1991, personal donation.

[71] Bolin, op. cit. (66); Houghton, op. cit. (4).

[72] Tora Skodvin, 'Origin and design', in Kari de Pryck and Mike Hulme (eds.), *A Critical Assessment of the Intergovernmental Panel on Climate Change*, Cambridge: Cambridge University Press, 2023, pp. 11–18.

[73] Alison Shaw and John Robinson, 'Relevant but not prescriptive? Science policy models within the IPCC', *Philosophy Today* (2004) 48, pp. 84–95.

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development.[74] From Bolin's view, they had to address questions related to impacts such as the potential increase in heatwaves or droughts, as well as the economic implications of different mitigation strategies at national and international levels.[75]

Due to their political significance, the SPMs and the overviews became the most authoritative texts issued by the IPCC.[76] Proof of that is that they have been the subject of major controversies and discussions within the IPCC, particularly regarding the framing of certainty with regard to the knowledge presented in them.[77] The discussions leading to the approval of the first assessment report were lengthy and intense. Fred Bernthal, chair of WGIII and US representative, insisted both privately and publicly that the document should insist more on the fact that knowledge was uncertain, with a clear intention of delaying the political process.[78] Despite the challenges in the approval process, Bolin managed to defuse internal tensions, and the IPCC's first assessment report (FAR) was largely considered a success.[79]

Presenting the results to stakeholders

During the preparation of the FAR, Bert Bolin was contacted by presidents and ministers interested in the IPCC assessment, seeking direct information from him as the chair. As a result, he encountered François Mitterrand in June 1989, when climate change experts gathered with the president to discuss environmental concerns and the future of the Earth.[80] Additionally, Bolin met with George Bush, the president of the United States, during the third IPCC meeting held in Washington, DC, and had a private conversation with Margaret Thatcher at the inauguration of the Hadley Centre for Climate Prediction and Research in May 1990.[81] These meetings illustrate what is widely acknowledged in the literature: by 1990, governments had already recognized the looming threat of climate change.[82] Bolin also addressed the political community in public at various significant events, including the Noordwjik Ministerial Conference in the Netherlands, and the Second World Climate Conference in Geneva.[83] Since Bolin's speeches were often the first exposure to the issue of climate change for many politicians and diplomats attending these events, it is worth examining the key points of his discourse that shaped the framing of climate change.

First, he presented the IPCC report as the foundation for negotiations on the UNFCCC, emphasizing the panel's commitment to providing advice and timely responses to the

[74] Bert Bolin, letter to Robert Watson', 18 January 1990, Stockholm, MISU Archive, box 'Correspondence 1990 (2)'.

[75] Bert Bolin, 'Science and policy making', *Ambio* (1994) 23, pp. 25–9; interview with Bert Bolin, 'Bert Bolin: a life in climate research (interview by Mike Kelly)' (1997); Bolin, op. cit. (66).

[76] Agrawala, op. cit. (3).

[77] Bolin, op. cit. (66), pp. 122–4; Houghton, op. cit. (4), pp. 160–82.

[78] Frederick Bernthal, letter to Bert Bolin', June 1990, Stockholm, Swedish Academy of Science Archive, Box 4A:1b; James Gustave Speth, *They Knew: The US Federal Government's Fifty-Year Role in Causing the Climate Crisis*, Cambridge, MA: MIT Press, 2021, pp. 76–7.

[79] Bolin, op. cit. (66), pp. 61–78.

[80] Hubert Curien, letter to Bert Bolin', 8 May 1989, Stockholm, Swedish Academy of Science Archive, Box 3A:3.

[81] IPCC, *Report of the Third Session of the Intergovernmental Panel on Climate Change (Washington D.C., 5–7 February)*, World Climate Programme Publications Series 1990; Bert Bolin, letter to Brigitta Dahl', 29 May 1990, Stockholm, Swedish Academy of Science Archive, Box 3A:4.

[82] Bodansky, op. cit. (10).

[83] Bert Bolin, 'Presentation to the Ministerial Conference on Atmosphere Pollution and Climatic Change by Bert Bolin, chairman of the Intergovernmental Panel on Climate Change. Noordwijk, November 6, 1989', Stockholm, Swedish Academy of Science Archive, Box 4A1:a; Bolin, 'The Intergovernmental Panel on Climate Change (IPCC)', in Jill Jäger (ed.), *Climate Change: Science, Impacts and Policy. Proceedings of the Second World Climate Conference*, Cambridge: Cambridge University Press, 1991, pp. 19–21.

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needs of the negotiating parties. The report was portrayed as an impartial compilation of knowledge from the world's leading scientific community, reflecting a consensus on the assessed information. Second, he summarized the key scientific and technical facts about climate change outlined in the report. Deforestation and the increasing emissions of greenhouse gases resulting from burning fossil fuel were identified as the primary drivers of global temperature rise. Without providing overwhelming technical details, he highlighted the potential impacts of global warming, such as sea-level rise and changes in precipitation patterns. Acknowledging uncertainties in regional changes, he anticipated major effects on ecosystems, agriculture and forestry. Bolin emphasized that climate change was a significant long-term issue requiring sustained attention, and warned that the negotiating process could span decades. Third, he stressed the imperative to take action, since remaining uncertainties should not be used as an argument for inaction. He stated that the magnitude of the problem and the possible seriousness of the consequences required urgent measures. He advocated for implementing low-cost mitigation strategies, such as efficiency measures, which could be justified on multiple grounds beyond climate change considerations. Finally, Bolin highlighted the intrinsic connection between climate change and the global energy system. He emphasized the need to stabilize carbon dioxide concentrations by reducing emissions from fossil fuels and curbing deforestation. He cautioned that, based on a business-as-usual scenario, the Earth's temperature could rise by 1 to 3 °C by 2025–30. Furthermore, he drew attention to the significant disparity in per capita emissions between developing and industrialized nations, presenting the differing responsibilities in causing climate change. Consequently, to make the political process successful, he stated, industrialized countries should take the lead in emission reductions.

These speeches demonstrate Bolin's proactive involvement in presenting the issue of climate change, not only in scientific terms, but also in emphasizing the political stakes. He guaranteed that policymakers were aware of the work being conducted by the IPCC and tried to ensure that their negotiation strategies and national policies were based on the IPCC's conclusions. Initially, the message was well received by governments. Proof of that is the words of George Bush expressing a strong commitment to the IPCC process of international cooperation on global climate change and asserting that 'the recommendations that this distinguished organisation makes can have a profound effect on the world's environmental and economic policy'.[84] The prime minister of the United Kingdom also gave a forceful speech about the seriousness of global warming and talked about the IPCC as an 'authoritative' assessment made by the 'world's leading scientist', expressing her commitment to reducing UK emissions.[85] By presenting the IPCC as the pre-eminent assessment, Bolin effectively compelled politicians involved in the negotiations to publicly affirm their reliance on IPCC findings as the basis for their political deliberations. This can be interpreted as a diplomatic strategy at a time when the challenges of reaching an agreement in the upcoming climate negotiations were already apparent.[86]

Bolin's determination to engage with influential stakeholders extended beyond governments. During the 1990s, a new global order characterized by growing globalization and free-market forces was emerging, and, in this context, corporations, particularly those

[84] IPCC, op. cit. (81), p. 4.

[85] Margaret Thatcher, 'Text of a speech made by the Prime Minister the Rt Hon Margaret Thatcher FRS MP at the opening of Hadley Centre for Climate Prediction and Research, in Bracknell on Friday 25 May 1990', Stockholm, Swedish Academy of Science Archive, Box 2B.

[86] For more on how the recently boostered historiography of science diplomacy addresses the role of scientists in international relations see Simone Turchetti, 'A diplomacy turn? Writing the history of science in the context of international relations', *Physis : International Journal for the History of Science* (2022) 57(1), pp. 225–244.

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in the energy sector, were eager to play a more significant role in global environmental regulation and politics. For this reason, as soon as the negotiations for the climate convention began, Bolin started receiving invitations to present IPCC findings in the private sector.[87] Most of his invitations came from the energy sector. In 1991, he participated in the 18th World Gas Conference in Berlin, the 13th World Petroleum Congress in Buenos Aires and the World Clean Energy Conference in Geneva, among others. In his speeches at energy conferences, Bolin mostly reiterated the discourse presented above but also addressed specific points directly related to energy policies and the role of industry in the climate change crisis:

> It is obvious that in order to slow down the expected change of climate the future global use of fossil fuels must decrease rather than increase, as usually predicted by the industry. Actually, very drastic reductions will be required … The petroleum industry as well as the gas and coal industries will have to analyze with urgency the implications of possible reductions of the use of fossil fuels as the prime future energy source for the world.[88]

Despite invitations to these events, Bolin felt that his presentations received little attention and had no discernible impact, so he tried to influence the energy agenda in other ways.[89] In the spring of 1991, he became special adviser to the board of the World Energy Council Commission, a group that was supposed to produce conclusions and recommend agendas for the achievement of strategic energy options across the world.[90] This involvement in the issue of future energy supply illustrates Bolin's growing interest in the economic issues of climate change.

Adoption of protection strategies (1991–1994)

The establishment of the IPCC occurred during a period characterized by heightened public awareness of the climate change issue through the media and press, but a period also of increasing polarization of views surrounding the issue, leading to a 'great climate debate'.[91] On the one hand, concerned scientists such as James Hansen and Michael Oppenheimer began communicating the gravity of climate change to policymakers in an alarming manner. They asserted that climate change had begun and warned that global warming would 'destroy much of the natural world and turn the world that we call civilization upside down'.[92] These dramatic claims were widely echoed and sometimes distorted in the press. On the other hand, articles dismissing global warming as nothing more than a hypothesis became frequent in the mass media. These efforts, which can be traced back to the 1970s, were orchestrated by a coalition comprising representatives from the fossil-fuel industry,

[87] Bolin, op. cit. (66), p. 72.

[88] Bert Bolin, 'The issue of global warming: knowledge, uncertainties and the need for action (abstract for the 13th World Petroleum Conference, Buenos Aires, 20–25 October 1991)', Stockholm, MISU Archive, box 'Correspondence 1991 (2)'; Bolin, 'Man-induced global change of climate. IPCC findings, the issue of uncertainty and the reasons for preventive action (abstract for the World Clean Energy Conference, Geneva, 4–7 November 1991)', Stockholm, MISU Archive, box 'Correspondence 1991 (1)'.

[89] Bolin, op. cit. (66).

[90] I.D. Lindsay, letter to Bert Bolin, 22 March 1991, Stockholm, MISU Archive, box 'Correspondence 1991 (1)'.

[91] Bodansky, op. cit. (10); Robert M. White, 'The great climate debate', *Scientific American* (1990) 263(1), pp. 36–45.

[92] Philip Shabecoff, 'Global warming has begun, expert tells senate', *New York Times*, 24 June 1988, at www.nytimes.com/1988/06/24/us/global-warming-has-begun-expert-tells-senate.html (accessed 17 July 2023); Michael Oppenheimer and Robert H. Boyle, *Dead Heat: Race against the Greenhouse Effect*, New York: Basic Books, 1990, p. 1.

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conservative think tanks and right-wing politicians to sow doubt about the scientific consensus on climate change.[93] This organized network disseminated misinformation and actively lobbied against policies to reduce greenhouse gas emissions.[94] Pivotal events such as the publication of the IPCC assessment in 1990 and the political negotiations leading up to the Earth Summit in Rio in 1992 further catalysed the public emergence of the climate change denial movement.[95] This had profound implications for climate policy and the public perception of the issue, as it successfully propagated a false sense of controversy and slowed the necessary response to the climate change crisis.[96]

An illustrative example of their efforts to undermine the credibility of climate science was the conference entitled Global Environmental Crises: Science or Politics? organized by the Cato Institute, a libertarian think tank, in June 1991. The conference brought together prominent climate sceptics who questioned the validity of climate models, downplayed the impacts of rising temperatures, and argued against the need for action to address the issue. The conference flyer prominently displayed a quote by Richard Lindzen, an atmospheric scientist from MIT, which encapsulated the conference's central message:

> The notion that global warming is a fact and will be catastrophic is drilled into people to the point where it seems surprising that anyone would question it, and yet, underlying it is very little evidence at all. Nonetheless, there are statements made of such overt unrealism that I feel embarrassed. I feel it discredits science. I think problems will arise when one will need to depend on scientific judgment, and by ruining our credibility now you leave society with a resource of some importance diminished.[97]

Shortly before the Rio Earth Summit, Fred Singer, a professor of environmental sciences at the University of Virginia, published *The Greenhouse Debate Continued: An Analysis and Critique of the IPCC Climate Assessment.*[98] Singer had become a regular presence in the American media in this period, repeatedly casting doubt on the science represented by the IPCC. Different members of the IPCC discussed the issue and decided that even if the IPCC itself should not reply to such criticism, individual scientists involved in the assessment needed to respond in their personal capacities.[99]

This criticism impacted Bolin's public and private discourse. Analyses of international environmental assessments have shown that, when criticized, experts who participate in these processes tend to respond similarly: they withdraw from making policy suggestions,

[93] Christophe Bonneuil, Pierre-Louis Choquet and Benjamin Franta, 'Early warnings and emerging accountability: Total's responses to global warming, 1971–2021', *Global Environmental Change* (2021) 71, p. 102386; Geoffrey Supran, Stephan Rahmstorf and Naomi Oreskes, 'Assessing ExxonMobil's global warming projections', *Science* (2023) 379(153), pp. 1–9; Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, New York: Bloomsbury Press, 2010.

[94] Michael M. Mann, *The New Climate War*, New York: Public Affairs, 2021.

[95] Peter J. Jacques, Riley E. Dunlap and Mark Freeman, 'The organisation of denial: conservative think tanks and environmental scepticism', *Environmental Politics* (2008) 17(3), pp. 349–85.

[96] Riley E. Dunlap, 'Climate change skepticism and denial: an introduction', *American Behavioral Scientist* (2013) 57(6), pp. 691–8.

[97] Richard Lindzen, quoted in '1991 CATO climate denial conference flyer and schedule', *Climate Files*, 20 May 1991, at www.climatefiles.com/deniers/patrick-michaels-collection/1991-cato-climate-denial-conference-flyer-schedule (accessed 30 July 2023).

[98] Fred Singer (ed.), *The Greenhouse Debate Continued: An Analysis and Critique of the IPCC Climate Assessment*, San Francisco: Institute for Contemporary Studies Press, 1991.

[99] John Houghton, 'Notes on IPCC bureau meeting – Washington 15 February 1991', London, British Library, box 'ADD Ms 89409/4/1'.

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seeking refuge in conventional scientific norms of objectivity and value neutrality to demonstrate their trustworthiness.[100] My analysis corroborates their view.

The IPCC's results as the best assessment available

Officially, the IPCC assessment aimed to produce a document that would cluster divergent opinions, providing a balanced viewpoint among the burgeoning public debate. For this reason, Bolin firmly believed that the interpretation of climate knowledge should be left to the institution and not be entrusted to journalists, as they often tend to exaggerate and potentially mislead the public.[101] As outlined in his autobiography, the emerging extreme positions served as 'a clear warning of how chaotic a debate between scientists and the public might become if a much more stringent approach to the assessment of available knowledge was not instituted'.[102] Drawing from the widely held notion that science can transform public controversies into scientifically objective facts, Bolin sought to rectify these misconceptions surrounding climate change knowledge in the IPCC assessment.[103]

The involvement of a significant number of scientists became crucial to his purpose. During that period, it became common in global environmental assessments to present objectivity not as an impartial and unbiased standpoint but rather as a composite of contrasting biased perspectives.[104] This argument was commonly used by Bolin:

> the IPCC has been accused of not being objective in its work. Of course, no single scientist can be completely objective, particularly about as complex an issue as that of human-induced climate change, but the collective work led by the IPCC is generally much more reliable than other attempts to summarize scientific research results for the political process.[105]

Additionally, Bolin advocated for a careful selection of lead authors who should, in his view, represent the best leading scientists in the world.[106] In this regard, Bolin's connections within the international climate science network played a critical role in attracting other reputable scientists to participate voluntarily in the IPCC, at a time when the panel had yet to offer recognition or prestige benefits.[107] However, the presence of renowned Western scientists alone was insufficient to gain the trust of developing countries. Throughout the 1980s, southern governments strove to increase their influence and the participation of their own scientists in environmental assessments. Had they been denied access to the IPCC, the institution's legitimacy would have been called into question.[108] Bolin recognized that developing countries harboured scepticism towards assessments in which their scientists were not involved, arguing that global representation would enhance the IPCC's

[100] Oppenheimer *et al.*, op. cit. (23), p. 187.

[101] Bolin, 'Science and policy making', op. cit. (75), p. 28.

[102] Bolin, op. cit. (66), p. 49.

[103] Shaw and Robinson, op. cit. (73); Bert Bolin, letter to Eva Arnvig', 20 September 1989, Stockholm, Swedish National Academy of Science Archive, Box 3A:1.

[104] Oppenheimer *et al.*, op. cit. (23), p. 188.

[105] Bert Bolin, 'Politics of climate change', *Nature* (1995) 374, p. 208.

[106] Bert Bolin, letter to N. Sundararaman', 9 May 1989, Stockholm, Swedish National Academy of Science Archive, Box 4A:1a.

[107] Agrawala, op. cit. (3).

[108] Frank Biermann, 'Whose experts? The role of geographic representation in global environmental assessments', in Mitchell *et al.*, op. cit. (22), pp. 87–112.

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international credibility.[109] With this objective in mind, Bolin advocated for an increase in the participation of developing countries.[110] He actively sought opportunities to attend significant scientific events held in those nations, to present the institution and to foster professional connections.[111] At a time when tensions over development and climate change mitigation strategies were at their peak, this can be seen as a crucial move to foster transnational scientific collaboration within the IPCC and enhance cooperation between nations.[112] His appointment as a foreign fellow of the National Academy in India in 1990 is a testament to the success of his efforts.[113]

The procedures employed in the assessment process also played a crucial role in bolstering the credibility of the IPCC. During the first months, the working procedures were not clearly defined, and the assessment operated in a self-organized manner, primarily guided by the shared norms of the physics community and the peer review process.[114] This initially provided an advantage to the IPCC, granting it substantial flexibility.[115] However, the mounting pressure on the IPCC's results during the negotiations of the framework convention compelled the panel to formalize its procedures, particularly by imposing stricter peer review norms to enhance its credibility.[116] Bolin played a significant role in establishing these new norms, engaging in discussions with the chairs of the working groups on the best methods to 'prevent numerous issues', especially disapproval regarding the assessment process.[117] These procedures were formally approved in November 1992.[118]

As criticism of the IPCC grew more prominent in the media, Bolin chose to address the arguments put forth by the critics. While touching upon scientific aspects of the issue, his primary focus was on defending the integrity of the assessment process:

> The IPCC process of assessment is open and transparent. It is based on available scientific literature, and a peer-review process is essential for analysis. Different

[109] Stephen H. Schneider, 'Three reports of the Intergovernmental Panel on Climate Change', *Environment* (1991) 33(1), pp. 25–30, 25.

[110] IPCC, *Report of the Second Session of WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) (Nairobi, 28–30 June)*, World Climate Programme Publication Series, 1989; IPCC, op. cit. (81); IPCC, *Report of the Fourth Session of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) (Sundsvall, Sweden, 27–30 August)*, World Climate Programme Publications Series 1990; IPCC, op. cit. (57).

[111] N. Sundararaman, letter to the members of the IPCC Bureau, 9 October 1989, Stockholm, Swedish National Academy of Science Archive, Box 4A:1a.

[112] This is a well-known strategy studied by historians of science diplomacy. This emerging framework provides significant and valuable tools to understand the complexities of this internationalization of scientific research and assessments. See Simone Turchetti *et al.*, 'Introduction: just Needham to Nixon? On writing the history of "science diplomacy"', *Historical Studies in the Natural Sciences* (2020) 50(4), pp. 323–39; Matthew Adamson and Roberto Lalli, 'Global perspectives on science diplomacy exploring the diplomacy–knowledge nexus in contemporary histories of science', *Centaurus* (2021) 63, pp. 1–16; Söenke Kunkel, 'Science diplomacy in the twentieth century: introduction', *Journal of Contemporary History* (2021) 56(3), pp. 473–84.

[113] Bert Bolin, letter to Professor S.K. Sinha', 22 February 1990, Stockholm, MISU Archive, box 'Correspondence 1990 (1)'.

[114] Agrawala, op. cit. (3), p. 624; Oerlemens quoted in Oppenheimer *et al.*, op. cit. (23), p. 156.

[115] Bolin, op. cit. (66), p. 51.

[116] Agrawala, op. cit. (3); Paul N. Edwards and Stephen H. Schneider, 'Self-governance and peer review in science-for-policy: the case of the IPCC Second Assessment Report', in Miller and Edwards, *Changing the Atmosphere*, op. cit. (14), pp. 219–46; Social Learning Group, *Learning to Manage Global Environmental Risks*, Cambridge MA: MIT Press, 2001.

[117] Robert Reinstein, letter to Bert Bolin, 11 January 1992, Stockholm, MISU Archive, box 'Correspondence 1992 (2)'.

[118] IPCC, *Report of the Eight Session of the Intergovernmental Panel on Climate Change (Harare, Zimbawe, 11–13 November 1992)*, World Climate Programme Publications Series, 1992.

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> scientifically sound viewpoints should be described, and scientists from both developed and developing countries participate.[119]

Closely tied to allegations about the IPCC's credibility were the accusations of a lack of consensus within the scientific community regarding the knowledge presented by the IPCC. Consensus among experts about an issue is seen as a critical factor for the effectiveness of an assessment since it signifies that knowledge has been settled and can be used to inform policymaking.[120] Therefore the claim that the scientific community lacked agreement on the issue was particularly concerning regarding its potential impact on the political process, especially during the discussions surrounding the signing of a climate change convention in 1992.

One example is the article by Fred Singer published in the *Wall Street Journal* as 'No scientific consensus on greenhouse warming'.[121] There, he argued that there was no scientific agreement on the existence or causes of potential global warming and disputed the notion that the IPCC represented the entire community of climate scientists.

Multitudinous correspondence between Bolin and other members of the IPCC shows that they were highly concerned about this accusation. In their exchanges, they deliberated various strategies to counteract these criticisms.[122] Their efforts from then on were focused on refuting the accusations. Robert Reinstein, the US delegate, and chair of WGIII, sent a copy of Singer's article, mentioned above, to Bert Bolin, emphasizing the importance of the IPCC's credibility to bring such voices into the IPCC and ensuring that they had a full opportunity to be heard.[123] In addition, he stressed that they 'must strive to assure that our process is as open ... and [as] tolerant of dissenting views as possible'.[124] In turn, Bolin forwarded the same article to John Houghton, chair of WGI, and explicitly suggested including Richard Lindzen, the sceptic scientist quoted in the CATO conference flyer, in a workshop organized by the IPCC. Bolin also asked if he had ideas for widening participation to include scientists with a critical attitude toward the first IPCC report: 'It might be desirable'.[125] The wish to include different perspectives was formally institutionalized during the eighth session of the IPCC, where it was stated that 'suitable expression of the differences of opinion among contributors and reviewers is necessary'.[126]

Clear boundaries between science and politics

During the period surrounding the establishment of the UNFCCC, increasing external pressure on the IPCC had a growing effect inside the organization. An example of this is the disagreement between Bert Bolin and the IPCC's vice chair, Al-Gain, regarding a statement made by Bolin during an INC session in December 1992: 'Already, this basic knowledge

[119] Bolin, op. cit. (105).

[120] Oppenheimer *et al.*, op. cit. (23), p. 11.

[121] Fred Singer, 'No scientific consensus on greenhouse warming (commentary)', *Wall Street Journal*, 23 September 1991, p. 14.

[122] Bert Bolin, letter to Mostafa K. Tolba', 25 January 1991, Stockholm, Swedish National Academy of Science Archive, Box 4A1a:2; John Houghton, letter to Bert Bolin', 22 August 1991, Stockholm, MISU Archive, box 'Correspondence 1991 (1)'.

[123] Robert Reinstein, letter to Bert Bolin', 1 October 1991, Stockholm, MISU Archive, box 'Correspondence 1991 (2)'.

[124] Reinstein, op. cit. (123).

[125] Bert Bolin, letter to John Houghton', 7 October 1991, Stockholm, MISU Archive, box 'Correspondence 1991 (1)'.

[126] IPCC, op. cit. (110), p. 9.

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might suffice to agree on some first steps towards more stringent actions'.[127] As previously mentioned, Bolin had advocated immediate action in various meetings. However, the context had changed, and this statement was no longer considered valid. In a private letter, Al-Gain suggested that the panel should be cautious about appearing advocacy-oriented, for fear of misconstrual by environmental-advocacy groups. He emphasized the need to prevent the IPCC from crossing the line between hard science and the application of scientific findings to policy.[128] In his response, Bolin agreed that IPCC representatives should refrain from making statements that could be misinterpreted, particularly in relation to political issues, and expressed concern about the polarization that had developed within the INC and had spilled over into the IPCC.[129] Including critical views in the assessment, among other factors, had resulted in further complications during the intense debates of the working-group meetings. It had become increasingly common for industry representatives and delegates from countries heavily dependent on fossil-fuel use or extraction to scrutinize and challenge the scientific foundation of the IPCC's findings.[130] Therefore, behind closed doors, Bolin actively reminded IPCC members that the panel was not a forum for political negotiations and advised them on how to handle highly controversial issues in their respective meetings.[131]

Numerous additional examples show that Bolin actively engaged in 'boundary work' during this period, especially to defend his impartiality. In a private interview in 1992, he said, 'I have constantly been trying to separate the scientific–technical issues from those of a political nature. Although I have my own views about what needs to be done, it should not influence my acting as chairman of the IPCC.'[132]

In this conversation he also stated the IPCC never recommended what should be done, but rather talked about the likely consequences of alternative actions or no actions at all.[133]

Recognizing the potential decrease in the legitimacy of the IPCC's results as a support for action if perceived as politicized, Bolin took the initiative to publicly address this concern in the journal *Nature*. To provide clarity on the interplay between science and policymaking within the IPCC, Bolin authored an article entitled 'Science and policy making', explicitly probing this matter and presenting the IPCC assessment process as following the 'linear model of expertise':

> Scientists as well as politicians need to recognize their different roles. The former must protect their scientific integrity, but also respect the role of politicians. Scientists must also be viewed as honest representatives of their scientific colleagues, to ensure that the assessment process will maintain its credibility.[134]

He stressed that scientists possess a unique understanding of the intricate interactions within the complex global environment, and they must inform policymakers with

[127] Abdulbar Al-Gain, letter to Bert Bolin', 19 December 1992, Stockholm, MISU Archive, box 'Correspondence 1992 (2)'.

[128] Al-Gain, op. cit. (127).

[129] Bert Bolin, letter to Abdulbar Al-Gain', 28 December 1992, Stockholm, MISU Archive, box 'Correspondence 1992 (2)'.

[130] Agrawala, op. cit. (3).

[131] Bert Bolin, letter to Jim Bruce', 17 April 1993, Stockholm, Swedish National Academy of Science Archive, Box 4A1b:5.

[132] Bert Bolin, letter to Matthew Patterson', 4 September 1992, Stockholm, MISU Archive, box 'Correspondence 1992 (2)'.

[133] Bolin, op. cit. (132).

[134] Bolin, 'Science and policy making', op. cit. (75), p. 27.

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assessments that can be used in a political context.[135] However, scientists alone cannot decide when it is time for preventive action:

> Agreements on preventive or adaptative measures by society should be based on a combination of factual, scientific information as provided by the IPCC and on value judgments ... It is not the task of the IPCC to recommend actions, but rather alternative possibilities and their consequences.[136]

In this highly politicized context, Bolin and his colleagues were confronted with a difficult decision – whether to take a position in the political debate or retreat from it. As is often the case, in the face of threats, scientists prioritize maintaining their societal position rather than firmly asserting their political opinions.[137] In the case of Bert Bolin, it appears that safeguarding the authority of scientific expertise, particularly through the IPCC, took precedence over openly engaging in the debate.

Some reflections on these protective strategies

While some argue that the institutional and discursive separation of the IPCC from political negotiations, particularly after the establishment of the INC, has had stabilizing effects on the climate regime, and thus has been deemed 'successful' in preserving the IPCC's authority, it had unintended consequences.[138] Let us briefly mention some of them.

First, the pressure to prevent scientists from talking openly about their political preferences to address climate change – for instance, clearly advocating a move away from the fossil-fuels energy system – resulted in a loss of pressure in the political process. Since scientists involved in the assessment process could not freely talk about political options, the range of voices that were indeed involved in the political debates was significantly reduced. As shown by sociologist Grundmann, the IPCC's avoidance of policy advocacy has limited the efficacy of its knowledge, thereby hindering progress compared to the successful case of ozone layer protection.[139] Scientists who talked openly about their political preferences in tackling climate change were publicly silenced since they did not adhere to the specific narrative on which the IPCC based its legitimacy within the scientific community.[140] In contrast, scientists who advocated waiting until the scientific debate had settled down were seen as having a more 'nuanced' approach to the problem and were thus included in the assessment process, leading to a systematic bias in favour of a more conservative approach to the problem.[141] In that sense, by insisting on the IPCC's political neutrality, certain dynamics were obscured. It concealed the fact that some countries, such as Saudi Arabia or the USA, used the IPCC as a negotiating body, exerting internal pressure to highlight certain scientific findings to emphasize uncertainty and delay necessary actions. Only years later have scientists involved in the assessment spoken clearly about those internal pressures and how they biased the assessment process.[142]

Second, by emphasizing that scientific knowledge should guide the negotiations, selecting which information is policy-relevant, Bolin overlooked the potential for other actors

[135] Bolin, 'Science and policy making', op. cit. (75), p. 29.
[136] Bolin, 'Science and policy making', op. cit. (75), p. 27.
[137] Oppenheimer *et al.*, op. cit. (23), p. 187.
[138] Miller, op. cit. (13).
[139] Grundmann, op. cit. (16).
[140] Oppenheimer *et al.*, op. cit. (23).
[141] Brysse *et al.*, op. cit. (30).
[142] Bolin, op. cit. (66); Houghton, op. cit. (4); interview with Vellinga, op. cit. (7).

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and types of knowledge to wield direct political influence ever the negotiation process. This oversight undermined the recognition of alternative forms of expertise, such as those derived from the social sciences and humanities.[143] This had an impact that extended beyond the IPCC to other environmental advisory organizations that adopted the IPCC model, further limiting the diversity of voices and perspectives crucial for informed decision making.

Finally, even if it seems paradoxical, by attempting to establish a clear boundary between science and politics, they inadvertently increased their interdependence.[144] When science forms the basis for political action, it becomes more susceptible to criticism, and what are meant to be political disagreements are sometimes disguised as scientific controversies.[145] Presenting the IPCC in idealistic terms rendered the institution vulnerable to criticism as it struggled to live up to the lofty expectations placed upon it. A more sincere and humble approach to science's role in the assessment process may have been more helpful in protecting it from critics.

Conclusions

In the late 1980s and early 1990s, climate change transitioned from being a scientific issue to becoming a political and diplomatic concern on a global scale. This shift was driven by various factors involving numerous actors, such as institutions, states, diplomats and scientists. This article has contributed to the historical understanding of this period by examining the case of Bert Bolin, the inaugural chair of the IPCC, who played a crucial role at the beginning of international negotiations surrounding the global-warming issue.

Even before the establishment of the IPCC, Bert Bolin had demonstrated key qualities that positioned him as a prominent climate expert on the global stage. While these characteristics were instrumental in establishing Bolin as an expert, this article has primarily focused on the relational aspect of expertise, the actions undertaken by experts and the discourses they perpetuate. It has been shown that Bolin was connected to a multidimensional network of actors – including scientists from all around the world, important political figures such as presidents of leading nations and representatives of energy commissions – and that he used these different circles of communication to spread political awareness of the climate change issue.

The article has also shown that the different roles of experts cannot be divorced from the political and social context in which they operate, as these factors significantly influence how their views on the issue are expressed. At the time of the IPCC's creation, Bolin's primary focus was to establish effective communication channels with governments and other important stakeholders such as energy companies. In this way, he acted as a mediator between the technical knowledge presented in the IPCC reports and the entities that had the power to implement actions. In doing so, the Swedish scientist framed the climate change problem and its possible solutions in a specific way, influenced by his own political opinions and values. Concretely, he emphasized the possible impacts of climate change and its dangers, concluding that immediate action was needed to mitigate these effects.

Soon, when voices appeared in the media questioning the rigour of the IPCC and the scientists involved, Bolin engaged in another task: protecting and legitimizing the organization he represented. He addressed these criticisms both privately and publicly, striving

[143] Poul Holm and Verena Winiwarter, 'Climate change studies and the human sciences', *Global and Planetary Change* (2017) 156, pp. 115–22; Mike Hulme, 'Geographical work at the boundaries of climate change', *Transactions of the Institute of British Geographers* (2008) 33(1), pp. 5–11.

[144] Dahan and Guillemot, op. cit. (12), p. S9.

[145] Roger A. Pielke, 'Policy, politics and perspective', *Nature* (2002) 416(6879), pp. 367–8.

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to convince the world that the IPCC's assessment reports were objective, unbiased and rigorous. Moreover, he included sceptical scientists in the assessment process, thinking that this would appease the critical voices that the IPCC represented the consensual voice of the climate community. He presented the IPCC as adhering to the 'linear model of expertise', wherein scientists provide neutral information to policymakers, who then consider this knowledge within different value and moral systems to make informed decisions.

Today, the IPCC, despite having been the object of numerous attacks, remains the foremost authority on climate change assessments. In this regard, Bert Bolin, as its inaugural chairman, laid a solid foundation for subsequent reports up to the present. Some characteristics introduced during Bolin's tenure, such as clear and specified procedures, endure to this day. Under successive leadership, the IPCC has continued to evolve and adapt to its social context; presently, it embraces a broader spectrum of expertise, including social sciences and local and indigenous knowledge. Furthermore, to fortify its objectivity, the institution acknowledges the imperative of diversity in gender and geographic representation.[146] However, even if those strategies can be considered 'successful' in protecting the IPCC's authority and credibility, we should not forget that the intergovernmental institution has largely failed in guiding the political process toward a binding convention that tackles, effectively, climate change. The article has suggested that some of the protective strategies proposed by Bolin, and continued by subsequent chairs of the organization, may have interfered with the effectiveness of the political process toward mitigating and adapting to climate change.

Before concluding, I would like to clarify an important point: Bolin did not work in isolation. As this article has demonstrated, he collaborated, negotiated and engaged with other experts who, like him, sought to have their voices heard and represented in the IPCC. While the fact that he was not alone does not diminish his significant role, my analysis of Bert Bolin and the early IPCC era has necessarily left certain questions unanswered. Further historiographic research on other key figures in this period may emerge in the near future, complementing my study and contributing to a more comprehensive understanding of the complex network of experts who shaped the early history of the IPCC. Other open questions are the roles of meetings, conferences and other face-to-face interactions in the assessment process; what contributions experts from private companies, NGOs and other non-state entities made; and how other assessment institutions shaped the interface between science and policy differently. I am optimistic that the recent surge in interest in diplomacy, conferences and expertise in climate change historiography will stimulate research in these areas, fostering lively and productive debates.

By acknowledging the complexities of scientific advice's inherently political nature, historians of science can contribute to enhancing debates on better ways of assessing environmental issues. Leaving behind the illusion of neutrality and objectivity surrounding scientific knowledge is crucial for comprehending the broader implications of expert advice and for fostering more informed and effective decision-making processes in addressing climate change and other complex societal challenges.

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[146] Julie Jebeille, 'Values and objectivity in the Intergovernmental Panel on Climate Change', *Social Epistemology* (2020) 34(5), pp. 453–68.

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