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Knowledge, Power and Order in the Construction of Environmental Politics

In 1985, the Villach Conference produced a statement that acknowledged that 'While some warming of climate now appears inevitable due to past actions, the rate and degree of future warming could be profoundly affected by governmental policies on energy conservation, use of fossil fuels, and the emission of some greenhouse gases' (WMO 1986). This conference is identified as a pivotal moment in the emergence of climate change on the political agenda. The statement raises questions about shared constructions of environmental degradation and questions of power: who wrote this statement, on the basis of what authority, and how was it acted on? What was the role of scientists and scientific knowledge in identifying this problem? What other actors and social, political and economic forces structured this construction of the issue?

These were the questions I started out with, and the Intergovernmental Panel on Climate Change (IPCC) was the site to study them. For this, I needed a method – conceptual and methodological tools – that would enable me to explore how and by whom climate change is constructed for social and political action. I started with scholars that shared an interest in the problematisation of environmental degradation, examining the frameworks they developed to undertake empirical research and inform their analysis. This chapter charts my journey through the key scholars and approaches that provided the foundations for this book. The review takes us through some of the most influential and comprehensive frameworks for identifying the role of science and scientists in environmental degradation in international relations (IR) and science and technology studies (STS), which include the epistemic community model, discursive and ideational frameworks and the idiom of co-production.

Scientific knowledge identifies the causes and consequences of shared environmental issues and as such, empowers new sets of actors and forms of authority in international politics. The epistemic community model provides a framework for delineating the role that transnational communities of scientists play in defining

an issue for political response (Haas 1989, 1990) and provides the basis for schol-
arly accounts of the emergence of climate change on the political agenda and the
institutionalisation of climate science within the IPCC (Lunde 1991; Boehmer-
Christiansen 1994a, 1994b; Paterson 1996; Newell 2000). Revisiting these early
histories initiates the book's journey into the IPCC and enables me to retell the
emergence of climate change as an object of politics. However, criticism of the
epistemic community model has been equally important in furthering understand-
ing of the relationship between knowledge and politics in the construction of global
environmental action, particularly for bringing power and who holds it into focus.
The work of Karen Litfin (1994) on ozone discourses and Maarten Hajer (1995)
on the framing of acid rain shifts analytical attention from expert communities to
discursive practices. These approaches introduce new sets of actors and highlight
the degree of contestation and struggle in social construction processes. While
these approaches do not add to knowledge of climate politics or the IPCC per se,
they set important standards for putting together the book's analytical framework.
To bring climate change back into view and to explore the power of economic
and social order in its construction, the chapter turns to the normative framework
developed by Steven Bernstein (2001) and the STS idiom of co-production and
its application by Clarke Miller (Jasanoff 2004a; Miller 2004). These approaches
bring broader patterns of social organisation and their effect on the IPCC and its
assessments of climate change into focus. Thus, by the end of the chapter we have
a more complex cast of actors and processes involved in the problematisation of
climate change than from where we started, but questions around the properties of
power and their distribution remain.

2.1 Power versus Science: The Epistemic Community Model

The epistemic community model arose from interest in how and why cooperation
between states occurs. Peter Haas sought to understand why, despite differences
over who should pay and reluctance to forsake short-term economic welfare,
states cooperated in environmental regimes where there were no clear mutual
interests between states or guarantees that protection costs would be equally
distributed (Haas 1990: 347). Haas suggested that international environmental
regimes stemmed as much from transnational communities of shared knowledge,
or epistemic communities, as state power (Haas 1989, 1990, 1992a, 1992b). An
epistemic community is defined as 'a network of individuals or groups with an
authoritative claim to policy-relevant knowledge in their domain of expertise'
(Adler 1992: 101). Members of these communities are said to: (1) share knowl-
edge about the causation of social and physical phenomena in an area for which
they have a reputation for competence, (2) have a common set of normative beliefs

about what will benefit human welfare in such a domain, and (3) share a common policy project. The expertise of an epistemic community is in particular demand in instances where there is uncertainty about the physical characteristics of an issue and how best to politically pursue a response. In these cases, the epistemic community helps states to identify their interests, frame the issue for collective debate, propose specific polices and identify salient points for negotiation (Haas 1992a: 2). In this approach, power – although not designated as such – lies in the community's authority to define the problem for political response, which may be further consolidated by the institutionalisation of the scientific view within national administrations and international secretariats (Haas 1992a: 4).

The epistemic community model has proven influential in interpreting the emergence of climate change as an international political issue (Lunde 1991; Paterson 1996; Haas 2000; Newell 2000). Matthew Paterson (1996: 144) concludes that 'the international development of climate as a political issue … can plausibly be interpreted in terms of the effect of the development of an epistemic community on the subject'. Further claiming that, '[I]n the IPCC we can see the epistemic community at its most organised' (Paterson 1996: 146). Even those more critical of this approach acknowledge the role of an epistemic community in raising the political profile of climate change (Vogler 1995: 204; Bernstein 2001: 161). Revisiting these accounts provides useful historical background on the emergence of the IPCC and enables an exploration of how science and scientific knowledge have been theorised in the positioning of climate change on the political agenda.

Scientific interest in the effect of atmospheric gases on the global climate has a long history, dating back at least as far as 1824, when the French philosopher Jean-Baptiste Fourier hypothesised that the atmosphere trapped heat in a manner similar to a 'hothouse', or greenhouse (Weart 2008). The heat-trapping capacity of atmospheric gases, such as carbon dioxide (CO_2) and water vapour, was first tested by the female scientist Eunice Foote, who presented her findings at an annual meeting of the American Association for the Advancement of Science (AAAS) in 1856 (Sorenson 2011). Credit is usually given to John Tyndall for this initial discovery, who observed the same effect through laboratory experimentation in 1859 (Weart 2008). The role of heat-trapping gases in the atmosphere and their effect on the prevailing temperature was elaborated over the nineteenth century, and by 1886 the Swedish scientist Svante Arrhenius had quantified the contribution of carbon dioxide (CO_2) to the heat balance of the earth, indicating that a doubling of atmospheric CO_2 concentrations could increase average global surface temperature by 5.7°C (Bolin 2007: 4). Despite these discoveries and a series of papers on fossil fuel emissions and climate change by G. S. Callendar in the 1940s and 1950s, it took advances in computer modelling, rising CO_2

concentrations and increased support for international scientific cooperation to initiate sustained scientific interest in human's impact on the climate (Paterson 1996; Shackley and Wynne 1995; Haas 2000; Edwards 2001, 2010; Miller 2001a; Weart 2008; Zillman 2008).

One of the first scientific assessments of 'the possible impacts of man's activities' on the climate was generated by a three-week international scientific gathering held in Sweden in 1971 (SMIC 1971). This report is said to have become 'required reading' for participants at the UN Conference on the Human Environment held in Stockholm the following year (Kellogg 1987: 121). This conference represented mounting concern over human's negative impact on the environment, including human's potential to alter the climate. It called for increased research and monitoring of CO_2 build-up and established a new UN agency for the preservation of the environment: the United Nations Environment Program (UNEP) (Agrawala 1999: 159). In 1979, the first World Climate Conference was held in Geneva, organised primarily by World Meteorological Society (WMO), it provided a major international platform for scientific interest in climate change (Agrawala 1998a: 607). The conference recognised climate change as a serious problem and issued a declaration calling on the world's governments 'to foresee and prevent potential man-made changes in climate that might be adverse to the well-being of humanity' (WMO 1979). Efforts were also initiated to create an international climate research programme, which eventually led to the creation of the World Climate Programme (WCP). Co-sponsored by the WMO, the newly formed UNEP, and the International Council of Scientific Unions (ICSU), the WCP was the first internationally coordinated program of climate research and proved critical for fostering greater scientific interest, furthering research into climate change and supporting the translation of scientific knowledge into political concern (Paterson 1996: 28–29).

International scientific conferences and workshops continued into the 1980s. As the focus of these events shifted towards the social and political implications of climate change the events increasingly sought and attracted the attention of a diversified range of actors, including the policy oriented. Although different explanations are cited, authors agree that the 1985 Villach Conference was pivotal (Bruce 1991; Boehmer-Christiansen 1994a; Hecht and Tirpak 1995; Jaeger and O'Riordan 1996; Franz 1997; Haas 2000; Bernstein 2001). Co-sponsored again by UNEP, ICSU and the WMO, the Villach Conference is said to represent the core of an epistemic community (Bernstein 2001: 162) and to have initiated the politicisation of climate change (Paterson 1996: 29). At this conference the 89 participants from 29 developed and developing countries and three sponsoring organisations confirmed global warming trends (WMO 1986), and there was an apparent 'shift of emphasis' away from more research required towards assertions of the need for

political action (Paterson 1996: 31). The report that emerged from this conference was widely disseminated and formed the basis of the Brundtland Commission's recommendations in *Our Common Future* on action to protect the earth's climate (Franz 1997: 22; WCED 1987).

The 1985 Villach conference also initiated the establishment of an international scientific committee, institutionalising some of the most proactive members of the epistemic community. UNEP's director, Mostafa Tolba, first tabled the idea of an advisory panel to guide climate change policy at the Villach conference (Agrawala 1999: 160). The committee was to explore policy options for responding to climate change, set research priorities and conduct assessments of the long-term impacts of climate change (Agrawala 1999). Tolba's idea was embraced by several conference participants, and in 1986 the Advisory Group on Greenhouse Gases (AGGG) was established under the auspices of WMO, UNEP and the ICSU (Agrawala 1999: 160–61). The AGGG was composed of a group of seven experts that were each involved in the parent bodies, had long-standing scientific careers and were linked to national bureaucracies (Agrawala 1999). It was envisioned that the AGGG would design and implement 'constructive interventions into energy, climate, and socio-economic areas' (WMO 1986: 43 in Agrawala 1999: 161). Although this first attempt to institutionalise scientific advice on climate change would be overshadowed by the IPCC (Agrawala 1999), the AGGG performed its role according to the epistemic community model – devising and disseminating climate change policy response options through support of workshops and conferences.

Two such workshops were arranged for 1987, the first of which is said to have advanced scientific understanding of the regional impacts of climate change, and the second, the policy discussions on mitigating these effects (Franz 1997). As the focus of the community's efforts shifted towards the policy implications of climate change the professional backgrounds of the invited participants began to diversify, with an increasing number of policy-oriented actors in attendance. At the first workshop in Villach, 48 participants from academia, environmental advocacy groups and some national environmental agencies attended. The second workshop, held in Bellagio, Italy, was policy focused and brought together new policy-oriented actors, including representatives from UNEP, environment departments in the United States, the Netherlands and the European Union, and NGO actors (Franz 1997: 23). The workshop indicated that policies were necessary to keep temperature and sea level increases within 'tolerable rates', with 0.1°C/decade suggested as a suitable global threshold for temperature increase (Franz 1997: 23–24). The group also calculated emission reduction targets, with a 66% reduction in CO_2 suggested and proposals on how to achieve this (Franz 1997).

The largest and most influential policy audience on climate change gathered in 1988, at the Toronto conference on 'The Changing Atmosphere: Implications for Global Security'. Three hundred and forty-one delegates attended the conference, representing 46 countries and 24 international organisations (Franz 1997: 25). Amongst the most notable of the policy audience were Gro Harlem Brundtland, the Norwegian prime minister and leader of the Brundtland Commission on Environment and Development (WCED), the Canadian prime minister, and a number of G7 ministers (Agrawala 1999: 162–63). Participants were provided with a common framing of climate change through a background paper informed by the Villach and Bellagio workshops and written by a member of the AGGG. The final conference declaration called for a 20% reduction in OECD (Organisation for Economic Co-operation and Development) emissions from 1988 levels by 2005, making it the most significant climate policy initiative at the time (Agrawala 1999: 169).

It was not only scientific initiatives that were significant in raising the profile of climate change. In 1988, a number of other events helped to move climate change to a topic of broader social and political concern. Two of those events occurred in June. The first was a statement made by NASA scientist, James Hansen, in US Congressional hearings that were convened due to unusually hot and dry summer conditions (Hecht and Tirpak 1995: 383–84; Jaeger and O'Riordan 1996: 16). Hansen stated that he was 99 percent certain that the warming of the 1980s was not a chance event. Unexpected patterns of drought, floods and other extreme weather occurrences were also being experienced globally, including in the USSR, Africa, India, China, Brazil and Bangladesh (Boyle and Ardill 1989: 1–4). These events increased political interest and media attention in the scientific predictions of global warming and in the Toronto conference, which received high levels of media attention as a result (Franz 1997: 25–26). This momentum was built on by Malta when they raised climate change as a matter at the UN General Assembly. By December 1988, a resolution had passed (UNGA RES/43/53) endorsing the establishment of the IPCC.

There are disparities between scholar's accounts of the establishment of the IPCC. Some credit UNEP's Mostafa Tolba and his letter to the United States Secretary of State with the IPCC's formation (Hecht and Tirpak 1995; Agrawala 1998a; 1998b). Others highlight that UNEP was more interested in a framework convention than a scientific panel, suggesting instead that the IPCC emerged from debate and corridor consultation at the 1987 World Meteorological Congress in Geneva (Zillman 2007: 870–71, 2008: 27–28). Officially, it was after consultations within and between the WMO congress and the UNEP governing council that a co-sponsored intergovernmental assessment panel on climate change was agreed (Bolin 2007: 47). The critical feature of this newly established body was its

intergovernmental nature, which meant that the organisation created for generating international assessments of climate change was a governmental and scientific process. Divisions between departments appear to have contributed to an intergovernmental process over the science-led organisation of previous assessments. Although the Environmental Protection Agency and Department of State were supportive of a convention process, the Department of Energy (DoE) opposed policy action and was critical of the Villach outputs because government officials had not been involved (Hecht and Tirpak 1995: 380–81). The outcome of discussions between these parties was a US proposal for 'an intergovernmental mechanism' to conduct a government-led, scientific assessment of the climate change issue (Agrawala 1999: 611).

Thirty countries accepted the WMO Secretary General's invitation to the first session of the IPCC, including 11 developing countries (IPCC 1988). This session was concerned with formalising the structure and function of the panel, although many of these decisions had been prepared prior to the session (Bolin 2007: 49–50). The work of the panel was divided into three main areas: science, impacts and response strategies. The tasks of the three working groups were elaborated during the session and the IPCC chair and WG chairs were elected (Zillman 2007: 873). This process institutionalised key members of the epistemic community responsible for raising the political profile of climate change in the 1980s, most notably the newly elected IPCC chair Bert Bolin, and supported the claim that this model explains the source of new international institutions (Adler and Haas 1992).

Although the epistemic community model has been used to explain and explore the origins of the IPCC and the politicisation of climate change, Haas (1990) is sceptical of its applicability to this issue area. He identifies a number of factors inhibiting collective action on climate change driven by epistemic consensus, including the recalcitrance of the United States, the cost of action and the unequal distribution of costs between states (Haas 1990: 358–59). Haas has been particularly sceptical of the IPCC's role in fostering epistemic consensus, claiming that the intergovernmental nature of the IPCC stifles the epistemic community's ability to function as theorised. In fact, Haas considers the IPCC an attempt by governments to gain control over the scientists and the diplomatic process, which had ascended too quickly up the political agenda in the 1980s under the epistemic community's influence (Haas 2000, 2004; Haas and McCabe 2001). He suggests that the intergovernmental design of the panel makes it difficult to operate and implement independent initiatives to progress collective climate action. For instance, the IPCC chairman is elected by member governments, which gives the panel the power to prevent the appointment of effective epistemic community members (Haas 2004: 581).

The failure of the epistemic community to engender greater international political action on climate change indicates the complex social and political components of understanding, defining and treating the climate change issue, complexities recognised as making it a much harder case for multilateral diplomacy than other environmental issues (Haas 2008: 2). By the mid-1980s the climate change community had framed climate change for collective debate, proposed specific policies and identified salient points for negotiation (SCOPE 1986; WMO 1986). It is not that the scientific community failed to provide a definition of climate change, rather a complex interplay between scientific, economic and political dynamics in the conceptualisation of climate change resulted in the rejection of the scientist's definition of the problem and proposed policy options. However, this account of the politicisation of climate change and the IPCC's establishment also indicates weaknesses in the underlying assumptions of the epistemic community model, particularly concerning the role of science in the construction of political issues. Confronting Haas's account of truth and power reveals some of the limitations of focusing on epistemic communities in analysis of the problematisation process.

The misgivings Haas documents in relation to the IPCC are informed by his view that knowledge can improve politics, a theme that is developed throughout his work on social learning and its agents: epistemic communities (Haas 2000, 2004; Haas and McCabe 2001). Haas is concerned with 'usable knowledge': scientific knowledge that is accurate and politically tractable to politicians and policymakers (Haas 2004: 572). Authority and legitimacy are vital constituents of usable knowledge, and in order for it to be recognised as such, Haas stresses that the institutional processes for developing usable knowledge must remain insulated from political interference (Haas and Stevens 2011). According to this account, the knowledge generated by the IPCC should have taught the decision-makers that cooperation on an international agreement to reduce greenhouse gases was in their best interests. Why, then, after 30 years of the IPCC, six rounds of assessment reports, and a Framework Convention, are emissions still rising? For Haas, the answer lies in the intergovernmental nature of the IPCC, which failed to separate truth from power and, as such, has not produced legitimate, usable knowledge. Haas concludes that the IPCC has been designed 'to keep science on a tight leash and, not surprisingly, IPCC scientists have been unable to exercise sufficient discretion to develop more politically tractable advice' (Haas 2005: 396).

Haas's view of knowledge and politics has been strongly criticised for its rationalistic assumptions. These criticisms reveal a number of limitations in how epistemic communities are theorised to function. Firstly, the epistemic community model assumes that it is both possible and preferable to separate scientific

knowledge from social and political processes (Lidskog and Sundkvist 2015). Secondly, the model assumes the knowledge transfer pathway and social learning are unidirectional: science educates politics (Newell 2000). Thirdly, the model does not consider the interests of the epistemic community or the competition between communities of experts and how these dynamics shape constructions of the problem (Bernstein 2001). Taken together, the assumption is that scientists and scientific knowledge diagnose environmental problems in the absence of social, political and economic forces. However, scholars have demonstrated how politics impinges on scientists in the form of self-censorship and knowledge selection in compiling IPCC assessment reports (Newell 2000). This leads Newell to conclude that the knowledge/power transfer from scientific expert to policy community runs both ways, rather than the linear one-way transfer implied by the epistemic community model (Newell 2000: 42).

The work of Litfin (1994), Boehmer-Christiansen (1994a, 1994b), Newell (2000) and Bernstein (2000, 2001) highlights the complex relationship between social, political and economic forces in the conceptualisation of environmental issues. Bernstein (2001: 174), for example, highlights that scientists were not the only authoritative experts interested in climate change and development, as environmental economists also sought, or were solicited, to influence policy formulation. The epistemic community model both overlooks the interests of the scientific community and assumes the professional background of these actors to be analogous prior to study. As Wendy Franz's (1997) account of the Villach conference makes apparent, in many instances scientists were unwilling to translate the science of climate change into policy response options for fear of appearing too close to policy and thereby undermining their scientific authority. Instead, over the course of the 1980s, the community interested in climate change expanded and diversified, with policy-oriented actors attending workshops and conferences alongside the climate science community.

Finally, when the epistemic community is the central unit of analysis, the workshops, conferences and assessments that bring these actors together in practice are overlooked. And yet, it is actor's participation in these activities that constitutes them as epistemic community members and legitimate them as recognised international climate experts, making these sites critical to the community's formation and to the formation of a shared understanding of climate change. These activities are not simply a component of the history of climate science and politics – conferences, workshops and assessments are constitutive of how climate change has become known and acted upon collectively. In the following section, I look to alternative approaches for theorising knowledge and power in the construction of environmental problems that account for a more entangled relationship between scientific knowledge and political response.

2.2 The Power of Discourse

Seeking to explain by whom and through what processes ozone depletion was framed for and by the treaty process, Karen Litfin (1994) was the first to adopt a Foucault-inspired discourse analytical approach to study the social construction of global environmental issues. Litfin understands discourse as a set of linguistic practices and rhetorical strategies embedded in a network of social relations (Litfin 1994: 3). She uses this definition of discourse to interrogate the role and power of science and scientists in the treaty formation process and observes that while scientists played a facilitative role in initially framing ozone depletion, many were reluctant to step into the policy arena by making normative judgements about the social implications of their research. She also observed that once the scientists had produced this knowledge, it 'becomes something of a collective good, available to all who want to incorporate it into their discursive strategies' (Litfin 1994: 37).

According to this approach, power does not necessarily lie with those who produce knowledge; it also has the potential to empower those who make use of it – interpreting and manipulating it in their frame of the problem. Litfin conceptualises those responsible for shaping the discourse on ozone depletion as *knowledge brokers*: intermediaries between the scientists who produce the knowledge and the policymakers who consume that knowledge (Litfin 1994: 4). This is an important addition to the epistemic community model and runs counter to its causal logic – it is knowledge brokers that translate scientific knowledge, which Litfin suggests underscores that interpretation is more important than scientific fact (Litfin 1994: 37). Litfin concludes that the dominant discourse that emerged around ozone depletion was a powerful determinant of what could and could not be thought, delimiting the range of policy options and serving as 'precursors to policy outcomes' (Litfin 1994: 37). Her empirical investigation also indicates that while scientific knowledge may facilitate cooperation, the production and interpretation of knowledge is a political process. Thus, far from rationalising politics, knowledge of ozone depletion fed into new and existing arenas of political contestation (Litfin 1994: 19).

The discursive approach and analytical focus of Maarten Hajer's (1995) work, on the other hand, shifts attention from the role of scientists and scientific knowledge in treaty making to society's problematisation of environmental degradation more broadly. Hajer seeks to understand how issues are defined in the policy process and how emergent environmental discourses constrain political action and enable social change. He develops a Foucault-informed discursive analytical framework, conceiving of politics as a struggle for discursive hegemony, whereby actors try to convince others of their definition of reality (Hajer 1995: 59). Hajer understands discourse as 'a specific ensemble of ideas, concepts, and categorizations that are

produced, reproduced, and transformed in a particular set of practices and through which meaning is given to social and physical reality' (Hajer 1995: 44). In this approach, the institutional context is as important as language because it 'codetermines what can be said meaningfully' (Hajer 1995: 2). He identifies environmental discourse as fragmented and contradictory: 'an astonishing collection of claims and concerns brought together by a great variety of actors' (Hajer 1995: 1). Despite this, however, coherent definitions of the causes and consequences of environmental problems emerge, and Hajer seeks to illuminate how discursive order is created and maintained.

Hajer's study describes how the conceptualisation of environmental problems changed over time. When environmental degradation first emerged on the international political agenda in the 1970s, pollution was not considered a structural problem but rather as something that could be controlled and contained through quality control targets and abatement strategies (Hajer 1995: 25). Hajer identifies the environmental discourses that came to challenge this way of thinking, from those that popularised the notion of ecological crises, such as the *Limits to Growth* thesis (Meadows et al. 1972), to those that held modern society responsible for systemic environmental degradation, as captured by the text, *Small is Beautiful* (Schumacher 1974). While these discourses challenged the prevailing order, Hajer's account indicates that neither became hegemonic. Instead, strands of these environmental discourses converged with the institutional practices of international policy-forming organisations, such as the OECD and UNEP in the formation of the ecological modernization discourse. According to Hajer, the historical roots of this discourse lie in this convergence between discursive and institutional forces, which rendered continued development compatible with environmental care (Hajer 1995: 101–2).

The discourse of ecological modernization acknowledges structural design faults within modern society that produce environmental problems but assumes that through modern political, economic and social institutional reform, care for the environment can be internalised (Hajer 1995: 25).[1] Thus storylines around ecological modernisation present environmental protection as a 'positive sum game', environmental degradation becomes a management issue and, in principle economic growth and ecological problems can be reconciled (Hajer 1995: 26).

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[1] Ecological modernization was a concept first introduced by two German political scientists, Joseph Huber and Martin Janicke in the 1980s. Although originally an interpretation of how environmental policy had developed in Germany and the Netherlands (Langhelle 2000: 305), it is now deployed as both a social theory and a new policy-oriented discourse in environmental politics. For an introduction to ecological modernization and historical accounts of its development, see Buttel 2000; Fisher and Freudenburg 2001; Mol and Spaargaren 2000. Hajer's contribution is in tracing the emergence of the ecological modernization discourse during the 1980s and demonstrating its impact on the framing of the acid rain problem in the UK and the Netherlands.

Through his research of the acid rain problem, Hajer demonstrates that while different storylines competed to define the acid rain issue, dominant discourse coalitions formed around the ideas, concepts and categories of ecological modernization. Despite the success of the eco-modernist framing of acid rain, however, the institutional response was more consistent with prevailing end-of-pipe abatement strategies than the new policy discourse (Hajer 1995: 268).

The work of Karen Litfin and Maarten Hajer is important for disrupting dominant conceptions of science and politics, highlighting that the conceptualisation of international environmental problems is a contested arena. Litfin's empirical work identifies that scientists and scientific knowledge must compete with other actors in the construction of an issue for political response. Thus, far from remaining a separate and privileged domain, scientific knowledge becomes a force within on-going social and political struggles. Hajer's work illuminates how knowledge and social values are already configured in prevailing and emergent environmental discourses, which, along with existing national and international institutional structures, constrain the construction and treatment of a new environmental problem. Importantly, both discursive approaches make apparent that power is not concentrated in either scientific or political centres but rather is diffused across and between a range of actors in the problematisation process.

Although both discursive frameworks acknowledge social struggle, offer more diffused configurations of power and direct a critical gaze on a wider range of actors and institutional processes involved in the construction of environmental problems, neither Hajer nor Litfin systematically theorise the constitution and distribution of power between and across these actors and institutions. Questions remain over the distinct resources and forms of authority that each group of actor has in the struggle to define the problem, how authority is coupled to the distribution of material resources in broader social and political space and how this shapes how an issue is known addressed? The chapter turns to the theoretical approach and empirical insights of Steven Bernstein, whose work on the *Compromise of Liberal Environmentalism* sheds light on the power of ideas in global environmental governance and brings the importance of economic and political order into focus.

2.3 The Power of Ideas

Steven Bernstein's book on the *Compromise of Liberal Environmentalism* sets out to explain how 1970's environmentalism, premised on the incompatibility of environmental protection with socio-economic and political practices, evolved into liberal environmental governance, which predicates environmental protection on the promotion and maintenance of a liberal economic order. The norm-focused

theoretical framework that Bernstein developed to explain this shift, illuminates some of the processes that constrain the definition of climate change as a social and political problem, which according to Bernstein's conclusions, must fit with the current economic order to be widely accepted. Importantly, this brings the relationship between environmental problem definition and patterns of broader political and economic order into focus.

Bernstein's constructivist explanation for the compromise of liberal environmentalism centres on his understanding of norms, norm-complexes and social structure (Bernstein 2000, 2001). Bernstein uses these to build a multi-layered normative framework to explain why some norms get selected over others and to explore the implications of this on governing global environmental problems. When new problems like climate change emerge, a space opens up for rethinking present governing structures and for criticising the social and political values that underpin these, as is characterised by the problematisation of environmental degradation in the 1970s. However, when these ideas attempt to become more than criticism and to initiate social and political change they are confronted with extant norm-complexes governing social and political relations. Bernstein suggests that these new ideas must 'compete against existing social purposes' and are only like to become institutionalised as governing norms by 'finding a fitness with those structures' (Bernstein 2001: 216). This 'fitness' is determined by: (1) the perceived legitimacy of the new ideas (who they came from and with what claim to authority); (2) the extent these new ideas fit with prevailing governing norms; and (3) the degree of fit with key actors' identities (Bernstein 2001: 184).

In the case of environmental protection, Bernstein finds that new ideas governing international environmental protection only became widely acceptable once they had found some fitness with norms of liberal economic growth and development. The notion of sustainable development then *is* the compromise of liberal environmentalism, legitimising a form of international environmental governance that 'predicates environmental protection on the promotion and maintenance of a liberal economic order' (Bernstein 2001: 213). As a result, the privatisation of the global commons and market mechanisms is not only perceived 'as compatible' with environmental protection but also necessary for successfully capturing and incorporating environmental concern in the practices of state and non-state actors. These conclusions have implications for understanding the processes by which environmental issues are conceptualised and defined as social and political problems. In contrast to Haas, who saw the direction of discovering, defining and understanding environmental problems proceeding from science to politics, Bernstein's approach suggests that the conceptualisation of environmental issues is not a linear process. It is not necessarily the case that problems like climate change are discovered, understood and defined by scientific communities before

they can be governed, because current governing norms are likely to constrain the definition and framing of the issue before the physical extent of the problem is realised. Thus, although scientists may play an important role in raising the profile of the problem, once on the agenda, international political and economic structures shape policy-relevant research as much as vice-versa.

Evidence for this is in the extent that liberal economic theory and practice have impacted the institutional arrangements of the IPCC. Bernstein highlights how the content of Working Group III's (WGIII) report on climate change mitigation has increasingly focused on questions that fit with a liberal environmental research agenda. This is reflected in the increase in economists in the authorship and focus on cost-effective policy response options in the content since the second assessment report (SAR) (Bernstein 2001: 224–25; Corbera et al. 2016). This reorganisation of WGIII was driven by an attempt to enhance the political relevance of the IPCC's assessment for member governments (Bolin 2007: 80–81), rather than the result of scientific advances (Bernstein 2001: 171). It is the IPCC's assessment reports that have moved in line with a liberal economic order, and international political solutions are more likely to be accepted if they fit with norms of liberal environmental governance, as in the Kyoto Protocol, where reduction targets were linked to market mechanisms (Bernstein et al. 2010).[2]

Bernstein's work further complicates the relationship between scientific knowledge and political response. While from the discursive approaches we gained insight into a wider cast of actors, Bernstein's approach embeds the policy response in prevailing ideas of social, political and economic order. The effects of this can be traced through the IPCC's organisational development and observed in the research reviewed and promoted through the organisation's assessment activities. This mutual or co-construction between scientific knowledge and the political response to environmental degradation is further elaborated and tested by scholars of STS through the idiom of co-production

2.4 From Power to Social Order

Scholarship within STS has examined the intertwined relationship between natural and social orders in scientific knowledge of physical phenomena like climate change. As a discipline, STS brings to the fore – and essentially

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[2] The three main market mechanisms within the Kyoto Protocol are: (1) Emissions trading; (2) Joint implementation (JI) among developed countries; and (3) Clean Development Mechanism (CDM). All three of the Kyoto mechanisms work on the same basic principle: 'that assigning property rights to emissions and creating a market that allows them to be transferred will enable emission reductions to be achieved where it is most cost efficient, or cheapest, to do so' (Bernstein 2001: 118).

accepts as its starting point – that scientific knowledge is deeply entangled with social norms and hierarchies (Jasanoff 2004a). Several STS concepts designed to unpack and characterise this entanglement have informed how the IPCC is understood and studied today, including boundary organisation and boundary work, as reviewed in Chapter 4. However, in terms of looking directly at the multiple ways that knowledge and order become imprinted on and internal to the construction of new environmental objects, it is the idiom of *co-production* that is most relevant (Jasanoff 2004a, 2004b; Miller 2004).

One of the central concerns of STS scholarship, as studied through the idiom of co-production, is the relationship between scientific and cultural processes through which new phenomena like climate change emerge and are stabilised as social and political objects. In this approach, as well as STS more broadly, science is not assumed to be an autonomous sphere 'whose norms are constituted independently from other forms of social activity' (Jasanoff 2004b: 30), but an activity whose connections with other social realms, such as the political, are to be studied. As Jasanoff elaborates in her discussion of co-production, the material and cultural resources through which actors bring new natural phenomena into view often exist 'before the "discovery" of the objects themselves' (Jasanoff 2004b: 16).

Jasanoff identifies institutions, and in particular the making of new institutions, as a central site of co-production (Jasanoff 2004b: 39–40). It is through institutions that societies have 'tried-and-true repertoires of problem-solving, including preferred forms of expertise, processes of enquiry, methods of securing credibility, and mechanisms for airing and managing dissent' (Jasanoff 2004b: 40). This approach again identifies the emergence of environmental problems as a source of new institutions, which 'emerge to provide the web of social and normative understandings within which new characterizations of nature … can be recognized and given political effect' (Jasanoff 2004b). The central addition to the previous approaches reviewed, however, is that the idiom of co-production brings the physical phenomena back into view. As Jasanoff states, 'it's not about ideas alone; it is equally about concrete, physical things' (Jasanoff 2004a: 6). It is the omission of the physical order in the social sciences that the idiom of co-production helps to guard against, reminding the researcher that explanatory power is gained when natural and social orders are thought about 'as being produced together' (Jasanoff 2004a: 2).

Putting the idiom of co-production into practice, Clark Miller (2004) develops an alternative account of the politicisation of climate change, highlighting the power of ideas and suggesting that the climate had to be re-constructed as a global phenomenon before its significance as an international political issue could be recognised. Miller describes how the scientific framing of climate change was dramatically recast between the early 1960s and the late 1980s, transforming from a concept that was used to describe local and regional long-term weather patterns

to one that depicted a global-scale phenomena. He concludes that the re-imaging of the climate as a global system was central to the production of climate change as an object of international political action, as it 'brought views of the atmosphere in line with assumptions about the jurisdictions of international organizations' (Miller 2004: 51).

Miller's and other STS informed accounts identify the ascendency of Global Climate Modelling (GCM) as central to the transformation of climate change into a political object (see also Shackley and Wynne 1995; Demeritt 2001; Edwards 2010; Allan 2017). The computer modelling of the general circulation of the atmosphere meant that scientists increasingly studied and represented climate change as an integrated global system – a cognitive framing that was clarified and extended through the establishment of the IPCC and its first assessment report (FAR). Miller suggests that by bringing 'concepts of natural order and political order into line with one another, the IPCC served to co-produce new arrangements of global nature and civil society' (Miller 2004: 55–56). For this reason, Miller identifies the IPCC as both a product and an agent of co-production and stresses that the utility of the co-productionist idiom is that it attunes the scholar to 'the multiple ways that knowledge and order become coupled in the emergence of new objects like climate change' (Miller 2004: 61).

2.5 Summing Up

This chapter has sought to explore the different models, frameworks and approaches that scholars have developed to study the emergence of an environmental problem and the scientific and political processes through which these issues are known and addressed. Conceptions of scientific knowledge evolved through the review of the chapter, from the view of science and politics as separate spheres to the notion of knowledge as a resource for political actors to mobilise and acknowledgment of the intertwined nature of scientific knowledge production with social and political orders. These evolving accounts of knowledge identify the importance of convergence between the issue and the existing order in how an environmental problem like climate change is known and addressed.

The discursive and ideational-based accounts demonstrate that knowledge of issues like climate change is structured by existing institutionalised political and economic norms and practices. Miller's account, for example, highlights that cognitive frames of climate change had to resonate with and connect to the institutional remit of international organisations to become a recognisable object of international political action. Bernstein reaches a similar conclusion when he finds that new ideas and new issues, like climate change, had to find some fitness with the prevailing liberal economic order. This economic order of relations not only

pre-existed the discovery of climate change but is ultimately productive of the problem and its continuation is ensured through the (neo)liberal economic response measures that are prescribed as the solution. Nearly all the accounts reviewed stressed that the emergence of an environmental issue is frequently the source of new institutions. However, here too Hajer's conclusions are cautionary, highlighting the continuation of existing order through the practical response. As a result, despite discursive challenges to present ways of thinking and doing, institutional practices can remain unchanged in the practical implementation of a response.

These accounts of the necessity of convergence between the problem and present ways of knowing and doing change the narrative of the IPCC's emergence. The chapter began recounting the story of the IPCC's emergence through epistemic community accounts. These identified the scientific workshops and events that served to constitute an epistemic community on climate change and create the avenues through which growing scientific understanding of climate change and its consequences was communicated to policymakers. However, Miller's account suggests that it was not just a case of increasing scientific knowledge and its communication, but a shift in how climate change was known that is also key to understanding the establishment of the IPCC. It was through the emergence of climate change as a global phenomenon that required a collective response, which aligned the issue with the purview of international organisations. Bernstein's account also highlights the work that was necessary to create this alignment and to maintain political interest in the IPCC, which increasingly turned to economists and economic methods for evaluating policies to mitigate climate change.

In terms of addressing the study of order and power asymmetries in the construction of environmental problems, however, there remain conceptual and methodological gaps. Although Jasanoff indicates the potential of a co-productionist approach to account for social hierarchy, the forms of order that Miller's narrative highlight are globalising social and institutional arrangements. This leaves social order as a distribution of distinct forms of power within and across actors unaddressed. As I explore who has the power to construct climate change and what constitutes this power, there are two analytical capabilities that the book needs. The first is a way to locate the IPCC in broader political space, to ensure that the social order studied within the IPCC is situated within global distributions of economic, social and political resources. The second is to identify and measure the distribution of resources that is constitutive of the social order within the IPCC. It is this situating of the IPCC in global climate politics that I turn to next.