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Coproducing the Endangered Polar Bear: Science, Climate Change, and Legal Mobilization

LISA VANHALA

Applying insights from science and technology studies about the "coproduction" of science and sociopolitical order to research on legal mobilization yields important theoretical insights. Using the polar bear petition campaign by the Center for Biological Diversity as an illustrative case, this article shows how this protracted legal campaign around protection of the polar bear and its habitat opened up new legal opportunities for those advocating for the regulation of carbon emissions, mandated state-sponsored generation of climate science, legally constructed the polar bear as "endangered," and helped to shape the priorities of the nongovernmental organization itself.

I. INTRODUCTION

It is now abundantly clear that national courts are one arena in which battles about policy responses to climate change are being waged (Burns and Osofsky 2009; Marshall and Sterett 2019; Setzer and Vanhala 2019). Legal cases such as the 2007 US Supreme Court decision in *Massachusetts v EPA*, in which a number of US states and several cites brought suit against the Environmental Protection Agency (EPA) to force the agency to regulate greenhouse gases as a pollutant, and the *Urgenda* (2015) decision in the Netherlands in which the Urgenda Foundation won a legal case to compel the state to take more effective action to address climate change, are just two examples among myriad high-profile litigation campaigns. Both cases garnered significant public and media interest, shaped the regulatory landscape, catalyzed nongovernmental organization (NGO) and philanthropic interest in litigation as a potential tactic to address global warming, and sparked scholarly interest and analysis (Fisher 2013; Setzer and Vanhala 2019). In addition to these high-profile cases, Kim Bouwer (2018) argues that the concept of climate change litigation should be expanded to include less visible forms of climate change

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Address correspondence to: Lisa Vanhala, University College London—Political Science, 29-31, Tavistock Square, London WC1H 9QU, United Kingdom of Great Britain and Northern Ireland. Email: l.vanhala@ucl.ac.uk.

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litigation such as legal cases in lower courts or relying on private law. However, what the legal literature on climate change litigation tends to pay less attention to—whether it is looking at high-profile or more run-of-the-mill cases—is the sources of legal cases or the "support structure" for climate change litigation (Epp 1998). Who are the litigants bringing climate change cases? Why are they bringing these cases? What do they achieve when they mobilize the law? By shifting focus to the agents that mobilize the law, we can better understand why some issues and constituencies are brought before the courts while others are not. We can also contribute to an emerging understanding of the many and varied impacts of climate change litigation (Keele 2018; Marshall and Sterett 2019; Setzer and Vanhala 2019).

In two key ways, an emerging interdisciplinary field of research on climate change litigation offers a useful complement to the existing literature on the topic, which until recently has tended to focus on legal questions, such as the causes of action and arguments about standing (e.g., Preston 2009), or on the relationship between regulation, governance, and litigation (e.g., Vanhala 2013; Peel and Osofsky 2015; Setzer and Bangalore 2017). First, the sociolegal literature on climate change litigation has highlighted the advantages of decentering the analysis of law (Haines and Reichman 2008; Vanhala and Hilson 2013) and has sought to understand the role and impact of a range of actors associated with climate change litigation, including climate activists in criminal trials (Doherty and Hayes 2014; Hayes 2013), the fossil fuel divestment movement (Franta 2017), and climate denial groups (Ley 2018). Yet we have less of an understanding of why organizations whose missions might at first glance seem remote from climate change litigation become involved in these legal cases and what happens when they do. This article sheds light on how and why certain types of environmental organizations might mobilize the law to address climate change.

Second, the relationship between climate litigation and science is an area that has been identified as ripe for further study (Setzer and Vanhala 2019). Climate science has been shown to play a critical role in determining whether litigants have standing to sue (as in *Massachusetts v. EPA*) and in substantiating claims that a defendant's actions have caused (or will cause) plaintiffs alleged harm (as in *Urgenda*). Marjanac and Patton (2018) explore how, when drafting climate change litigation, lawyers can draw on scientific developments in "attribution science" that link the sources of greenhouse gas (GHG) emissions with specific climate-related harms. They also consider how this knowledge might alter the legal landscape. In other cases, science might not be necessary for the resolution of the dispute itself, but the lawsuit might seek to affirm or undermine the centrality of science in decision-making processes (Setzer and Vanhala 2019). Yet, what has been overlooked in this literature is how courts—when beckoned to do so by litigants—can mandate the production of climate change-related science. This article shows that the production of climate science can be an important "output" of the legal mobilization process as well as an "input."

This article seeks to connect these two areas of study by bridging research on legal mobilization theory on the one hand and understandings of the "coproduction of science" in the field of science and technology studies (STS) on the other. Scholars developing the idea of "coproduction" have shown that the process of knowledge production can play an important role in constituting social order. This process involves epistemic communities, policy networks, political actors, and (at times) courts in defining what sound science is, who can produce it, and how to assess and deploy it. The notion of coproduction also looks at how science shapes our understanding of policy and legal problems. By bringing an understanding of the recursive nature of "coproduction" processes to our research on legal mobilization, we are better able to account for the full

range of actors engaged in climate change litigation and the variety of impacts that can be achieved through legal challenges.

This article draws on an in-depth, illustrative case study of the early legal efforts of the Center for Biological Diversity (CBD) on the issue of climate change. CBD is an organization primarily focused on the protection of endangered species, but it has become a regular litigant in climate change cases. Drawing on this case study, I make two key arguments. First, I argue that the process of legal mobilization acts as a site of "coproduction" and can "settle" scientific questions that science itself cannot resolve (Jasanoff 2010, 309). In the example of the polar bear petitions, the "epistemic settlement" achieved through litigation then allowed for changes in government policy and practices with respect to state-sponsored generation of science on the impacts of climate change. What is particularly remarkable in this case is that this result was achieved despite a presidential administration that was hostile to the very notion of anthropogenic global warming. Second, I demonstrate that bringing the concept of "coproduction" into the literature on legal mobilization can show how using the law can have feedback effects on the organizations that mobilize the law. The evidence presented here suggests that the organization's involvement in the polar bear petitions helped to shape the organization's identity and mission with respect to the centrality of addressing climate change in its work.

The remainder of this article is structured as follows. The next section surveys existing theoretical accounts that have been offered to explain the turn to litigation. It introduces a new theoretical line of inquiry that creates a bridge between legal mobilization research and insights from STS about "coproduction" between science and sociopolitical order. The subsequent section presents the research design and methods. The fourth section then turns to an in-depth case study of CBD's involvement in climate change litigation. The discussion and conclusion sections link the theoretical insights with the empirical analysis and lay a path for future research.

II. THEORETICAL APPROACH

A. EXPLAINING LEGAL MOBILIZATION: EXISTING ACCOUNTS

Through the process of legal mobilization—that is, the deployment of law, legal frames, discourses, or symbols by individuals, activists, or groups—actors can prompt courts to step into climate change policy debates. There is now a rich theoretical literature accounting for why some groups mobilize the law while others do not. The factors that have been identified to account for the mobilization of law by collective actors lie at both the institutional level and the organizational level.

Political scientists have focused on dynamics at the level of political institutions. For example, early scholarship on legal mobilization traced the turn to the courts by groups that had been "disadvantaged" in traditional political arenas (Cortner 1968). Early research suggested that groups lacking access to the executive and legislative branches of the government consequently seek redress through the courts, using litigation as a last resort following the breakdown of institutional relationships or in the absence of such relationships in the first place (Galanter 1983). However, other research has shown how NGOs use the courts to complement their lobbying campaigns in legislatures or executive agencies. Coglianese (1996) found that in relationships between interest groups and the EPA), the interest groups with the most extensive, long-standing relationships with the EPA tended to be the ones most likely to litigate against the agency's regulations.

He found that this type of litigation in many instances represents just another round of an ongoing bargaining process.

Scholarship has also looked at legal institutions in addition to political ones to explain why some groups turn to courts. Drawing on social movement theory, scholars have deployed the concept of legal opportunity structure (LOS) to explain how the scope of access to justice and the nature of procedural rules in a particular jurisdiction both impact the likelihood that groups and individuals will mobilize the law and shape the ways in which they ultimately do (Hilson 2002; Andersen 2006; Vanhala 2011a; Conant et al. 2018; Kahraman 2018; Arrington 2019). The focus of this literature is the institutional-level constraints and incentives that determine a plaintiff's ability and willingness to sue. While different scholars include different variables in their conceptualizations of the LOS, there is some consensus that the available legal stock, the rules determining legal standing, and the rules on legal costs all matter (see Hilson 2002; Andersen 2006; Evans Case and Givens 2010; Vanhala 2012). Legal stock refers to the body of laws that exist in a particular field—including international law, constitutional law, and statutes and regulations. As Andersen (2006, 12) notes, "laws shape the kinds of legal claims that can be made as well as the persuasiveness of those claims." Changes in legal stock can create or limit opportunities for NGOs to frame their legal claims persuasively.

At the organizational level, a variety of variables have been considered in accounts of legal mobilization. A resource mobilization approach claims that organizations must be able to mobilize resources in order to pursue collective action. The extension of this to research on legal mobilization is that financial resources are a necessary (but not sufficient) condition for mobilizing the law. In a seminal study, Marc Galanter (1974) found that the "haves" tend to come out ahead in litigation efforts because of their ability to be "repeat players" in the courtroom. Charles Epp (1998) found that a "support structure" consisting of organizations committed to establishing rights and access to legal and financial resources is a necessary condition for a rights revolution. There is now a broad consensus that support structures are central to sustaining legal mobilization efforts (Alter and Vargas 2000; Cichowski 2007; Conant 2002, 2006, 2016).

Recent literature has begun to pay more attention to social movement characteristics beyond material resources to explain NGOs' tactical and strategic choices. There is widespread disagreement, however, about which characteristics matter the most. For example, legal mobilization has been explained by the need for elites to please rank-and-file membership (Hansford 2004; Solberg and Waltenburg 2006); internal intergenerational divisions over attitudes toward cooperation and conflict with state institutions (Morag-Levine 2003); the impact of opposing strategies from adversaries in particular venues (Holyoke 2003); the way in which a group frames the role of rights in the identity of their constituency (Vanhala 2011a); the role of lawyers as "strategy entrepreneurs" (Vanhala 2018); and relations of cooperation and competition across groups within a given field of action (Vanhala 2011a, 2011b). All of these approaches could be categorized under the broad umbrella of sociological theories of institutions that seek to account for why and when some groups are more likely than others to embed legal mobilization in their tactical repertoires.

Finally, some factors identified in existing research focus on the mechanisms that link the institutional and organizational levels of analysis. For example, research has suggested that some groups may have an inherent preference for turning to the courts because they perceive the courts to be more reputable, impartial, and effective decision-making bodies than bureaucratic agencies or biased majoritarian political arenas (Hirschl 2004; Lin 2012). Other scholarship has argued that groups that are in the

process of rights-based identity formation may also inherently prefer to turn to the courts as the most "appropriate" venue within which to try to influence policy based on these identity politics (Vanhala 2011a). While both of these mechanisms are focused on the role that perceptions play in the process of mobilizing the law, the former is more concerned with perceptions of various institutional alternatives, whereas the latter is driven by an organization's culture, its worldview, and the relationship between an organization's identity and political and judicial institutions.

B. FRAMING AND COPRODUCTION THROUGH LEGAL MOBILIZATION

This section connects frame theory with the concept of "coproduction" used in STS to help account for the mobilization of law to address climate change. Building on Erving Goffman's (1974) concept of frames as "schemata of interpretation," Snow and Byrd (2007, 123) argue that the framing perspective views actors not merely as promoters of existing ideas and meanings but as "signifying agents actively engaged in producing and maintaining meaning for constituents, antagonists and bystanders." This matters for legal mobilization efforts because framing involves "efforts to define a problem, its causes, and its potential solutions in ways that are calculated to gain support for the position of the actor doing the framing" (Mitchell 2010, 97). Framing processes shape which issues are seen as problems, which are discussed, and which are taken up for action (Vanhala and Hestbaek 2016, 113).

Critical scholars and those working in STS point out that the framing of environmental problems involves basic social and political as well as scientific judgments (Jasanoff 1997). These choices about which frames to deploy allow agents to critique existing structural arrangements and institutional practices as well as the societal consequences that they enshrine. Scholars working in this vein argue that the construction of a problem relies on discursive connections to preexisting concerns or threats that are rooted in discourses of identity, security, and power (Weldes 1999). Advocates need to persuade policymakers and the public that the problem deserves attention and that something can be done to address the problem. Allan (2017) points out that this is often done by creating a sense of injustice or crisis and then situating the construction in a discourse of management within a policy frame that suggests how the object can be governed. Chris Hilson (2012) finds that, particularly in climate change litigation, time and urgency can be portrayed in different ways.

I argue here that an explanation of the mobilization of law by NGOs is at best incomplete if it does not include an account of how the legal or policy problem that a given NGO seeks to address is constructed through framing processes and how organizations come to have an interest in addressing a given problem instead of some other one (Wendt 2001; Allan 2017). To do this, the article draws on insights from STS theory on "coproduction." Coproduction focuses on the idea that knowledge and political order "coproduce" one another in a continually changing yet self-perpetuating relationship. Coproduction is "shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it" (Jasanoff 2004, 2). Whereas most STS research examines the relationship between science and the state, this article narrows the focus to coproduction processes in legal mobilization efforts by NGOs. Sheila Jasanoff writes that

> At the heart of environmental decision-making is an attempt to connect knowledge about the world (expressed often, but not only, as scientific knowledge) with actions designed to advance particular visions of natural and social well-being. It is this link between knowledge

> and action that provides environmental NGOs their primary point of political intervention. (Jasanoff 1997, 580)

The NGO "action" of interest here is the mobilization of law. Fisher (2013) demonstrates that an STS perspective encourages us to see a legal case as a site for the interaction "between fact-finding and meaning making" (Jasanoff 2010, 248). Jasanoff sees litigation as one of many forms of administrative practices that are "deeply institutionalized modes of achieving pragmatic closures around epistemic claims and controversies that science alone could not have settled" (Jasanoff 2010, 309). This perspective understands problem construction as a dynamic process that unfolds between NGOs, state agencies, scientists, and judges who constitute and reconstitute environmental problems (Allan 2017). Legal mobilization, in this view, is a process in which an understanding of the social and the factual are coproduced and settled (Jasanoff 2010).

Bringing in an understanding of coproduction processes to debates about legal mobilization theory can shed light on three important issues. First, "epistemic settlement" through legal mobilization can have important impacts on policy, institutional practices, and state-sponsored generation of scientific knowledge on climate change. The development of new science as an outcome of legal mobilization has often been theoretically overlooked and empirically ignored.

Second, understanding coproduction through legal mobilization can also help us better account for strategic, ideational, and identity shifts within NGOs that may result from the use of legal advocacy. While now the threat of climate change to biological diversity is abundantly clear, a generation ago this was not the case. It would likely have seemed odd for an organization concerned with wildlife to engage in debates over how to reduce greenhouse gas emissions. Conservation organizations at the time tended to be very place-based and subnationally focused in their approach to the problem of endangered species and habitat protection; groups advocating on global warming were largely looking to the international level for policy solutions and regulation. Conservation organizations would have relied on the expertise of biologists and ecologists; organizations concerned with climate change would have worked with atmospheric scientists and climatologists. This case study highlights how the CBD's involvement in the process of legal mobilization reverberated back on the organization itself by rendering the linkages between wildlife conservation and climate change clearer.

Third, more broadly, an understanding of coproduction can help us to revisit long-established constitutive understandings of law and society developed by scholars like Michael McCann (1994), Sarat (1990), Ewick and Silbey (1998), and, more theoretically, Alan Hunt and coauthors (Purvis and Hunt 1993; Hunt and Wickham 1994). These scholars show how law is constitutive of society and that legal ideas are a part of (rather than separate from) the social world. The concept of "coproduction" does similar work in the realm of science and the social world: the literature drawing on this concept shows that science is constitutive of society and that scientific expertise is a part of our social worlds. By drawing these two themes together in a study of legal mobilization, this article demonstrates that in legal campaigns that involve science, it is fruitful to adopt this constitutive understanding of science and society in order to fully understand the role that scientific expertise can play in legal processes and to have a better understanding of the impact that legal disputes can have on the political generation or refutation of science. There is an ontological and theoretical coherence to seeing both "law" and "science" through the lens of constitutive causality, rather than using theories that treat legal ideas in such a way but not scientific ones.

III. METHODS, DATA, AND ANALYSIS

Over the last five years there have been a plethora of highly publicized climate change legal cases across a range of jurisdictions, including the Netherlands, Belgium, Pakistan, and the Philippines. Rather than focusing on high-profile legal cases across a number of different countries, this article adopts a different methodological approach. I am interested in exploring how and why NGOs shape—and are shaped by—coproduction through legal mobilization. CBD serves as an important case study for this phenomenon for several reasons. CBD is in some ways an "unlikely case" of an organization that would undertake a concerted and wide-ranging litigation campaign to address climate change. Fifteen years ago, it was a relatively small NGO in terms of the US environmental movement and had a very specific mandate to protect endangered species. While already an important player in terms of use of the law, the group relied extensively on the Endangered Species Act (ESA) to gain protections for wildlife under threat. For this reason, CBD offers us the opportunity to explore the potential relationship between coproduction through legal mobilization and organizational change.

This article focuses on the way in which legal and scientific knowledge and the sociopolitical priorities of NGOs are coproduced in legal mobilization efforts. As such, this article examines the involvement of CBD in climate change litigation and the impact of those efforts in terms of policy and state-driven processes of the generation of scientific knowledge. It also highlights the growing importance of climate change within the organization's mandate and strategy. The evidence I deploy to explore this includes data on the organization drawn from both public records (including annual reports, petitions submitted to executive agencies, and press releases, as well as modern texts such as blogs and tweets) and secondary literature. I also draw on data from the larger project of which this study is a part, which includes evidence from more than twenty-five in-depth semistructured interviews with NGO advocates and lawyers and external experts. The interviews were conducted in the San Francisco Bay Area (in 2015), in New York (in 2010 and 2017), and in Washington DC (in 2017).

IV. THE CENTER FOR BIOLOGICAL DIVERSITY AND CLIMATE CHANGE

The CBD, founded in 1995 as the Southwest Center for Biological Diversity (SCBD) and based in Tucson, Arizona, is an environmental NGO focused on protecting endangered species and biodiversity. CBD (2017) focuses on using scientific data, legal expertise, and the citizen petition provision of the ESA "to obtain sweeping, legally binding new protections for animals, plants, and their habitat."

Since its founding, the organization has grown to include a full-time staff of dozens of lawyers and scientists across a number of offices in the United States. Legal action is one of the main tactics deployed by the CBD. The organization's founders had experience in direct action activism, but one day a friend said to Robin Silver, one of the CBD's founders, "We're crazy to sit in trees when there's this incredible law where we can make people do whatever we want" (quoted in Lemann 1999, 106). Klyza and Sousa (2013, 145) describe the organization as being "especially aggressive in using litigation to achieve its goals, and some of its results have been stunning." For example, in the first two years of the George W. Bush administration, CBD lawsuits were responsible for *every* new species listed under the ESA (Klyza and Sousa 2013). By 2004, the CBD was responsible for getting 335 species of animals and plants protected under the ESA, more than any other environmental group (Bevington 2009). As Robin Silver summarized,

"The use of science in a very aggressive fashion as the basis for litigation—no matter what the political risk—is what made us different" (quoted in Bevington 2009, 10). The legal stock available to the organization played an important role in shaping its tactics and identity.

Since its founding, the CBD has grown rapidly in terms of resources and staff. In 1997, the SCBD had a budget of $384,000, while the CBD's 2005 budget increased nearly tenfold to $3 million with an expansion in operations, primarily to California. By 2015, its total revenue was $12 million. In 2015, the CBD had about 100 employees, with twelve working at the Climate Law Institute (Interview, CBD, November 16, 2015). Over the years, foundation grant funding has come from the Patagonia Foundation, the Pew Charitable Trusts, the Andrew Sabin Family Foundation, the Rockefeller Family Fund, and the Turner Foundation.

The CBD has relied extensively on the ESA in its litigation efforts to save imperiled species and their habitats. The statute is widely considered to be one of the strongest environmental laws in the United States and was passed at the high-water mark of the environmental movement. Anyone who has evidence that a species is imperiled in a particular habitat—that is, not yet in danger of total extinction—has the right to petition the Fish and Wildlife Service (FWS), an executive branch agency within the Department of Interior, to declare the species to be endangered or "listed." When a listing petition is filed by a third party, the FWS must determine within ninety days, to the maximum extent practicable, whether the petition presents sufficient data to warrant further consideration. Provided this initial finding is positive, the FWS has twelve months from receipt of the petition to determine whether listing is warranted, not warranted, or warranted but precluded (WBP). The US Supreme Court has declared the ESA "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation" (*Tennessee Valley Authority v. Hill [TVA]* 1978, 180). It is a "strikingly clear" law that requires that no federal action jeopardize an endangered or threatened species (Klyza and Sousa 2013). Several of the key features of the statute invite litigation: this includes the processes for listing species and for designating a habitat as critical, as well as the "citizen suit" provision, which allows interested parties, such as NGOs, to bring suit against both private and government entities to enjoin violations of the statute (Cummings and Siegel 2009). A third party can use litigation to kick start a stalled petition for listing or to demand that a determination be made on a species that has been under consideration for a lengthy period. Research has shown that many species have only gained protection because litigation jump-started the listing process for species neglected in long-term candidate or WBP status (Puckett et al. 2016).

All of this suggests that with a strong legal basis, a law that opened up the LOS for challenges, financial resources (and incentives) that could be mobilized for litigation, and an organizational identity that was rooted in the use of the law, the foundation for legal mobilization on the part of the CBD was obviously present. However, this gives rise to the following question: why did the CBD begin to mobilize the law beyond the goal of species protection to address climate change?

A. MOBILIZING THE ENDANGERED SPECIES ACT TO ADDRESS CLIMATE CHANGE

The shift from President Clinton to President Bush brought significant changes in policy direction on environmental action generally and climate action specifically. A president committed to action on pollution control and to protecting public land was replaced by one who was skeptical of climate action and committed to opening public land to development (Klyza and Sousa 2013). President Bush used his administrative discretion to

slow federal action on climate change on a number of fronts and announced that the US would not implement the Kyoto Protocol. There was a clear shift in political opportunities for those interested in promoting effective climate change policies. Within this context of hostility to action on climate change, CBD began its first litigation efforts on global warming.

In 2004, CBD submitted a petition seeking to list two species of Caribbean coral under the ESA. The petition detailed the decline of the species and projected future threats. The petition discussed the multiple factors negatively affecting the corals but placed a particular emphasis on the impacts of global warming. In the listing decision itself, however, the language offers what Cummings and Siegel (2009, 153) call "a rich example of the actions of scientists operating within the constraints of an agency not allowed to acknowledge the existence of global warming." The phrases "global warming" and "greenhouse gases" appear nowhere in the 10,000-word final listing rule. The closest the NMFS comes in the rule to acknowledging the existence of global warming is a sentence mentioning "levels" of carbon dioxide: "Along with elevated sea surface temperature, atmospheric carbon dioxide levels have increased in the last century, and there is no apparent evidence the trend will not continue" (quoted in Cummings and Siegel 2009, 153).

Cummings and Siegel (2009) identify three reasons why the listing of the corals transpired without significant controversy: there was no real scientific dispute as to their being imperiled; the National Marine Fisheries Service did not need to endorse the science of global warming or rely on predictions of future warming to find the species endangered; and the listing largely went unnoticed, so potential opponents to the rule (or its broader implications) did not become aware of it. CBD was explicit in its desire to use the successful listing as a legal tool to advocate for action on climate change. In a 2007 article, Kieran Suckling, one of CBD's founders, said "We think this victory on coral critical habitat actually moves the entire Endangered Species Act onto a firm legal foundation for challenging global-warming pollution" (quoted in Clayton 2007). In this way, the organization began to slowly strengthen the legal stock.

This incremental legal victory and emerging science about the threats faced by the polar bear led to another legal mobilization campaign that in many ways played an important role in constituting the polar bear as a key "object" of climate governance and reinforced a shift to climate work within the CBD. One interviewee at CBD noted that

> A lot of the scientific literature on polar bears and climate change really wasn't published until around 2004. And when that literature started to come out, that's when we looked at it and put together the listing petition to list the polar bear as endangered under the Endangered Species Act. (Interview, CBD, November 16, 2015)

In February 2005, the CBD filed a petition with the FWS to list the polar bear as a threatened species under the ESA. The petition argued that the polar bear was endangered or likely to become so in the foreseeable future given global warming trends and the inadequacy of US and international measures to combat greenhouse gas emissions. This petition differed from the previous coral petition because the decline of the polar bear was something projected to happen in the future rather than a contemporary phenomenon. The petitioners also pointed out that the ESA requires the government to identify and eliminate threats to imperiled species based solely on the best scientific information.

The politics of climate change came fully to the fore between the original filing of the petition and the listing decision. Throughout this process the FWS dragged its feet. CBD, joined by two additional NGOs, Greenpeace and the Natural Resources Defense Council (NRDC), filed notices of intent to sue and brought several lawsuits to compel FWS to make findings after it had missed multiple deadlines. In December 2006, the FWS announced that the agency would publish a proposed listing rule. The wording of the proposed rule avoided mentioning the terms "global warming" and "greenhouse gases" but did go into depth about the threat to polar bear populations by "ongoing and projected changes in their sea ice habitat" (quoted in Cummings and Siegel 2009). The announcement of the proposed rule generated more than 1,000 news articles, several hundred television reports, and more than 200 editorials. Most of them discussed the decision as a recognition of the reality of global warming by the Bush administration. The FWS received about 670,000 comments on the proposed rule, far more than had been received on any previous ESA proposal (Cummings and Siegel 2009).

In January 2007, the FWS proposed listing the polar bear as threatened throughout its range based on receding sea ice. At that time, Secretary Kempthorne directed the FWS and the US Geological Survey (USGS), a scientific agency of the US government, to aggressively work with the public and the scientific community to broaden understanding of what was happening with the species. This marked an important moment in the coproduction of scientific knowledge and sociopolitical order via legal mobilization. In September 2007, the USGS delivered to the FWS nine studies related to the future condition of the polar bear and its habitat.

On May 15, 2008, after numerous delays and reports of vehement disagreements within the Bush administration over the decision, Interior Secretary Dirk Kempthorne announced that the polar bear would be protected under the ESA. The role of science was pivotal during the listing process. In 2015, an interviewee from CBD noted that

> It's an interesting petition because it was based on really sound projections—but nonetheless projections—as to what was going to happen to polar bear habitat in the future. We're just starting to see some of the signs of distress in the population—it's not like the population has totally crashed yet. We're seeing more drownings, more malnourished polar bears. . . . But that sea ice was going to be gone, and especially would recede so far from land that there's no way that the polar bear was going to be able to survive. So that became in some ways the . . . I mean, you know, it was not the first species we started working on (in terms of climate change), but it became the mascot. (Interview, CBD, November 16, 2015)

At the press conference announcing the decision, Kempthorne illustrated the listing decision with charts depicting satellite images of the differences in sea ice from the fall of 1979 to the fall of 2007. It was noted in the press release that in developing the nine studies, the USGS relied upon ten peer-reviewed climate models, all of which projected a decline in Arctic sea ice in the future. In his remarks, the Secretary, who earlier in his political career had been a strong opponent of the ESA, added, "This has been a difficult decision. . . . But in light of the scientific record and the restraints of the inflexible law that guides me," he claimed to have made "the only decision I could make" (quoted in Barringer 2008). For some observers, this marked a watershed moment in the Bush administration's approach to the science of climate change.

On the face of it, the decision constituted an important victory for environmentalists. The polar bear was the first species to be listed under the ESA solely due to being imperiled by global warming (Cummings and Siegel 2009). Through this mechanism, the interaction of law and science constructed the polar bear as "endangered" in a new way. The science at the heart of the decision was based on projections rather than a description of

the current state of affairs. In the case of the ESA, classification as a threatened species requires a finding that the species is at risk of extinction "in the foreseeable future." In the case of the polar bear, the foreseeable future was interpreted by the FWS as forty-five years from 2007 (Hunter et al. 2010). The listing also offered the species some new protections: for example, hunters were forbidden to import hides or other trophies from bears killed in Canada.

Over the longer term, the listing of the polar bear also resulted in government resources being directed to the protection and further study of the impacts of climate change on the species. Figure 1 shows annual expenditure (for 2007 to 2014) on the polar bear by the FWS as well as the amount of resources devoted to the USGS to study the polar bear and its habitat. This highlights how legal mobilization can steer state agencies toward the production of scientific knowledge that further supports an NGO's framing of a problem even when political leaders are hostile to this framing.

However, in many ways the listing decision was also a mixed result. First, the announcement constituted an explicit blow against the possibility of using the legislation to limit greenhouse gas emissions. Kempthorne stated,

> While the legal standards under the ESA compel me to list the polar bear as threatened, I want to make clear that this listing will not stop global climate change or prevent any sea ice from melting. Any real solution requires action by all major economies for it to be effective. That is why I am taking administrative and regulatory action to make certain the ESA isn't abused to make global warming policies. (US FWS 2008)

The Interior Secretary stated that it would be "wholly inappropriate" to use the listing as a tool to reduce greenhouse gases and added that "when the Endangered Species Act was adopted in 1973, I don't think terms like 'climate change' were part of our vernacular" (quoted in Barringer 2008). Although the final listing decision links GHG emissions to sea ice recession and to projections of polar bear decline, it also expressly rejects

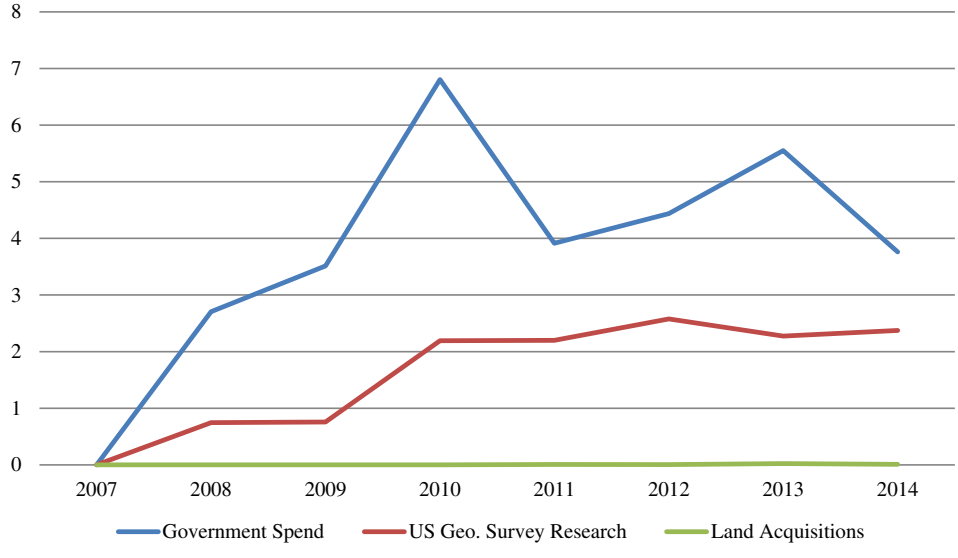

Figure 1. US Fish and Wildlife Service reports on annual expenditure (in millions) on the polar bear as endangered species (2007–14.) Source: US Fish and Wildlife Service. *Endangered Species Expenditure Reports 2007–2014*. https://www.fws.gov/endangered/esa-library/index.html#expenditure.

indirect regulation of GHG emissions pursuant to the ESA. CBD had been explicit in its desire to use the polar bear and coral species listings as legal tools to attack proposed coal-fired power plants and other new sources of carbon emissions. The nature of the listing decision limited those possibilities (Barringer 2008).

Second, the decision did not go as far as environmental groups had hoped it would in terms of creating practical impediments for fossil fuel companies. The Interior Department added stipulations, rarely used under the ESA, that would allow oil and gas exploration and development to proceed in areas where the bears live as long as the companies complied with the Marine Mammal Protection Act. Known as a 4(d) rule, this provision in the original legislation was intended to permit flexibility in the management of threatened species, as long as the chances of conservation of the species would be enhanced, or at least not diminished. Furthermore, the administration failed to designate critical habitat for the polar bear (Cummings and Siegel 2009). The addition of stipulations hollowed out the impact of the decision: a representative of CBD said that the listing would ultimately have little practical impact on protecting polar bears (Kassie Siegel quoted in Barringer 2008).

Third, the polar bear issue highlights the difficulties of rulemaking in a transnational context. Canada has a special obligation with respect to the conservation of the polar bear because an estimated two-thirds of the global population occurs in subpopulations that are within, or shared with, Canada (Environment and Climate Change Canada 2011). Responsibility for management of the bear populations lies with Canadian provinces and territories. The government of Nunavut had campaigned against new US protections for the bear, largely based on concerns that the lucrative local bear hunts by US residents would stop when trophy skins could no longer be brought home (Barringer 2008). In response to the decision, Canada's minister of environment said that the government would adopt an independent scientific panel's recommendation to declare polar bears a species "of special concern," a lower designation than "endangered" (quoted in Barringer 2008).

Fourth, there was significant backlash to the listing. The state of Alaska, the Alaska Oil and Gas Association, various other fossil fuel associations, and sport-hunting groups all came out publicly in opposition to the listing. Listing decisions are to be based solely on science, but political pressure is commonly brought to bear on Interior Department decision-makers regarding controversial listings. Nonetheless, in the listing announcement, the Interior Secretary relied on the limitations of scientific certainty with respect to specific attribution. Guidance was issued to the staff that "the best scientific data available today cannot make a causal connection between harm to listed species or their habitats and greenhouse gas emissions from a specific facility, or resource development project or government action" (US FWS 2008).

Nor did the decision decisively settle the epistemic or practical issues at stake. CBD was forced to continue to take legal action to protect the polar bear's habitat. In 2010, they succeeded in having 120 million acres of the species' habitat designated as protected, constituting the largest critical habitat designation in ESA history. This was then challenged by the state of Alaska and overturned, but the bear won back its habitat protection in 2016 (CBD 2017). In 2017, a few days after President Trump issued an executive order to rescind a ban on new offshore oil drilling in the Arctic and Atlantic oceans, a challenge to the FWS's designation of critical habitat for imperiled polar bears was brought to the Supreme Court (which refused to hear it) (CBD 2017).

V. DISCUSSION

The interrelationship between the legal mobilization efforts described above, the scientific data relied on and generated through those efforts, and the sociopolitical priorities of the CBD itself represent a "coproduction" process at work. The legal mobilization effort resulted in a range of sociopolitical and organizational outcomes.

First, these litigation campaigns had a profound impact on the meaning and reach of the ESA. In the absence of climate change legislation, Cummings and Siegel (2009, 172) write that the "ESA's breadth and force mean that it stands as one of the most promising mechanisms to force government and corporate entities to disclose, analyse, and mitigate the impacts of their greenhouse gas emissions." The potential of the ESA to exercise this form of normative and epistemic power was only reluctantly acknowledged and, in some ways, explicitly curtailed by the Bush administration, and it has continued to be heavily contested by adversaries. Nonetheless, the ESA has continued to be used as a tool to challenge greenhouse gas emissions. This was reinforced by the US Supreme Court's 2017 refusal to hear the challenge to the FWS's designation of critical habitat for imperiled polar bears.

Second, the legal mobilization effort helped to produce the *idea* of climate change in law and administrative practices under an administration that was very skeptical of climate action. The legal campaign relied on law and science to (for a time) "settle" the question of the causal link between global warming and the threatened polar bear. The framing processes established the threatened polar bear (and corals) as an emergent problem needing regulation. The legal mobilization effort also reinforced the production of the image of the imperiled polar bear as one of the key symbols of a warming planet. It is telling that polar bears are now the second most popular animal (after orangutans) to adopt through the World Wide Fund for Nature (Barton 2008). The reliance on the polar bear as a symbol of climate change has gone so far as to lead to a human-centered backlash among advocacy organizations. For example, campaigns by Oxfam and Christian Aid have adopted "people not polar bears" as their motivational slogan.

The experience of the polar bear petitioning process also helped to shape several key features of CBD's identity and tactics. As an organization that has long relied on litigation, the petition highlighted how CBD's primary legal tool could be deployed to raise consciousness and promote action on climate change. This both reflected and reinforced a mandate expansion by the CBD. Figure 2 shows the number of mentions of climate change (and related terms) that appear in the organization's annual reports, with significant growth from 2003 onwards.

This corresponds closely to the number of cases related to climate change for which the organization was lead plaintiff (see Figure 3). In addition to relying on the ESA, the CBD now regularly uses other laws such as the Clean Air Act, the Clean Water Act, and the National Environmental Policy Act (NEPA) in its efforts to tackle climate change. The organization has increased the number of staff working explicitly on climate change and has begun to send a team to the UN climate change negotiations. When asked about the amount of resources put toward climate work, one interviewee noted (in 2015),

> We have about 100 employees. There are twelve of us who work in the Climate Law Institute. But pretty much everybody's work involves climate at one point or another. . . . We have a large Endangered Species program, and every listing petition that they write these days has to grapple with climate change, has to grapple with what's going to be happening with water temperatures for fresh water species or alpine habitat for the pika. I mean, climate affects everything we do, so everybody ends up working on it. (Interview, CBD, November 16, 2015)

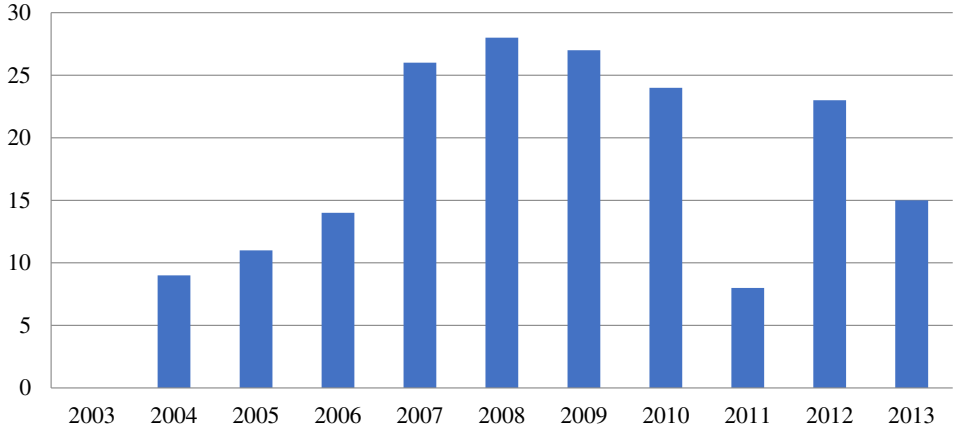

Figure 2. Mentions of climate change/global warming in annual reports of the Center for Biological Diversity, 2003–13. Source: Center for Biological Diversity Annual Reports. Includes mentions of "climate crisis," "climate-(driven/threatened)," "climate change," "global warming," "greenhouse gases."

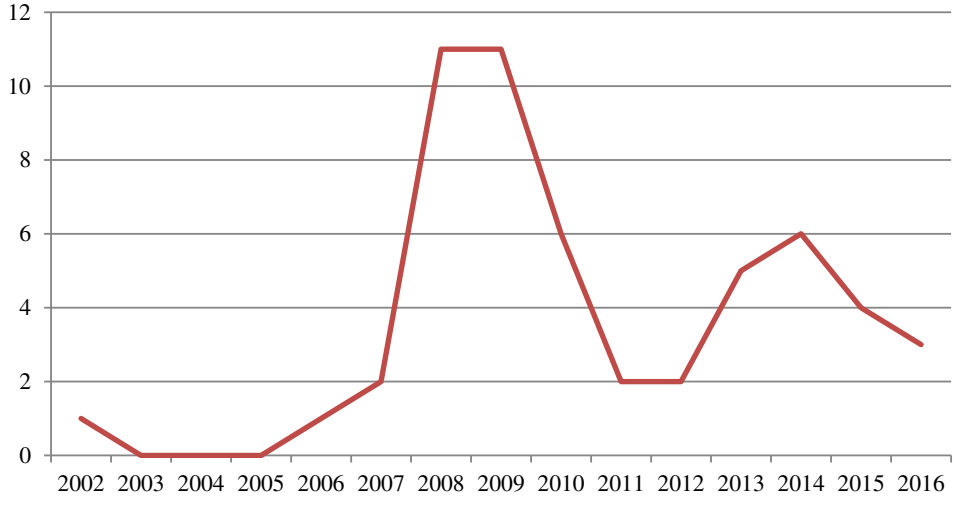

Figure 3. Number of climate change cases involving the Center for Biological Diversity. Source: Sabin Center for Climate Change Law at Columbia Law School. *Climate Change Litigation Database*.

Another feature of the CBD's identity that is coproduced through its legal mobilization on climate change is the idea that it is a "science-based" organization. In framing its identity this way, the CBD makes clear where it stands with respect to political compromises and that it values legislation and administrative processes that fall in line with this "science-based" approach. In describing the organization's tactics and positions vis-à-vis other groups, one interviewee highlighted the connection between "sound science" and political risk taking:

> I mean, at this point we are a national environmental organization, but we're a lot smaller than the NRDCs and Sierra Clubs and EDFs. And we've grown a lot very rapidly, from a group that initially was focused very closely on protection of biodiversity, protection of endangered species, and doing a lot of litigation around listings, and critical habitat/Endangered Species Act–focused stuff. But we've also always been a real outsider group, you know—really scrappy, willing to push the envelope, willing to take political risks that were backed up by sound science and fact. (Interview, CBD, November 16, 2015)

A third feature of CBD's identity that was affirmed through its legal mobilization and subsequent policy battles over climate change is its strong commitment to existing regulatory tools. As Cummings and Siegel (2009) put it,

> The irony of the U.S. foot-dragging on global warming is that the United States has the strongest domestic environmental laws in the world, capable of effectively and efficiently reducing greenhouse gas emissions immediately. . . . White new, science-based federal climate legislation that would mandate the deep greenhouse gas reductions from the U.S. economy necessary to address the climate crisis would certainly be welcome, it is critically important that new legislation build upon the successful regulatory regime already in place. (Cummings and Siegel 2009, 172)

This approach played an important role in one of the next legal fights to come, which pitted environmental groups and advocates against each other. Strong divisions in the movement over proposed cap-and-trade legislation in the early 2010s emerged. The proposed legislation divided those who were committed (or at least open) to market-based mechanisms versus those who wanted to see more command-and-control style regulation. One CBD lawyer noted,

> But it [the Waxman-Markey Bill] would've come at the expense of EPA's Clean Air Act authority; it would have waived a number of other laws, and various iterations of these bills would have gotten rid of the Endangered Species Act, of the Clean Water Act, of all of these other tools that we've really been looking to as good tools because they're science-based tools. You know, the Endangered Species Act requires the use of the best available science; the Clean Air Act requires air quality standards that are set at levels that are requisite to protect public health and welfare. They're science-driven, they're not . . . I mean they are political compromises, the way that all legislation is, but at their core, they're really driven by the science. . . . I think there were other groups that were much more willing to make the political calculation, "Let's get this done, let's get what we can now." (Interview, CBD, November 16, 2015)

Legal mobilization over the status of the polar bear has thus had an important impact on both the practices of the US FWS and on the focus and even the identity of the NGO at the heart of this legal campaign.

VI. CONCLUSION

This article brings the concept of "coproduction" from STS to bear on questions related to legal mobilization, yielding three important insights. First, the lessons of this case study add nuance to our understanding of how framing processes work in policy realms where scientific expertise is critical. Previous research has shown how framing can help to define what is seen as a policy problem. This case study shows how a science-based organization relied on emerging climate science to reframe the notion of "endangered" such that a law—the ESA—that those working to address global warming had not traditionally looked to was repurposed into another legal tool that could help to fight climate

change (Cummings and Siegel 2009). By applying to the way we study legal mobilization an understanding of how science and sociopolitical order are coproduced, we are able to better understand how and why new legal opportunities are opened, as well as how some subjects—the polar bear, in this case—"become" (in a legal sense) endangered.

Second, research on framing processes has also shown how frames can define who is seen as an appropriate actor to address a policy problem. While in many ways it is likely that the CBD would have begun to shift its attention to climate change as a threat to biodiversity given the growing scientific consensus on the matter, without the experience of the polar bear petition, it is also likely that its involvement in this series of legal challenges reverberated within the organization, causing it to become a regular player in climate change litigation in the US.

Third, linking research in STS to sociolegal studies has shown that the connections between science and legal arguments in climate change litigation are multifaceted. STS scholars have always been aware of the important role that courts play in "settling" epistemic issues. This builds on work by Jasanoff (2011), who suggests that notions of objectivity are culturally situated and contingent. She argues that performances of practices of objectivity "occur not only in expert committees and regulatory agencies but also in the courts, which through review of administrative rulemaking often enjoy the last word on the adequacy of policymakers' knowledge and reasoning" (Jasanoff 2011, 12). Previous research has suggested that science has been a critical part of climate change litigation with respect to legal questions of standing, harms, and causality. In other types of climate change cases, plaintiffs and defendants have argued over the role that climate science should play in policy-making processes. This research offers a different angle by showing how legal mobilization can shape the production of science by mandating state expenditure in an area of research that otherwise would not have been a political priority. CBD deployed the emerging science concerning the impacts of climate change on biodiversity to broaden legal understandings of the type of science that would be necessary to address the problem of wildlife conservation. Future research could further build on the work of Susan Silbey (2008) by linking the relationships between science, expertise, and legal consciousness in order to explore other ways in which these dynamics play out in climate change litigation.

Polar bear litigation has been ongoing over the last decade and shows no sign of abating. The knowledge being generated as a result of this litigation may be what Hulme (2010, 562) calls "brittle"—knowledge that is "thin and flat" in that it loses "efficacy in a plural and turbulent world" and is not able to accommodate local diversity and geographical differences in accounting for how global environmental and social change happens. Gaining a broader understanding of why some issues are truly settled while others are only resolved for a short period of time and then picked up again would be an important contribution to both our understanding of coproduction processes and to research on legal mobilization.

Finally, the emerging literature on the governance of the adverse impacts of climate change (known as "climate change-related loss and damage"), which addresses both slow-onset impacts such as sea-level rise and the increased likelihood and severity of extreme weather events such as hurricanes, could also benefit from attention on the part of scholars exploring legal mobilization and regulation through litigation (Vanhala and Hestbaek 2016). This article constitutes a first step toward exploring what will likely be a growing number of legal disputes over the negative impacts of a warming planet.

LISA VANHALA *is Full Professor of Political Science at University College London. Her recent research has been published in* WIREs Climate Change, Global Environmental

Politics, *and* Comparative Political Studies. *She is currently PI on a European Research Council Starting Grant project on the politics and governance of climate change–related loss and damage*.

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