

# Political Legitimacy in the Democratic View: The Case of Climate Services

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Wendy S. Parker and I have advanced an inductive-risk approach to the provision of climate information that relies on the contextual values of information users. This approach aims to improve the effectiveness of climate information in social decision making. The approach's emphasis on user values, however, conflicts with the so-called democratic view: if scientists employ contextual values, they ought to employ democratically endorsed values to preserve political legitimacy. This article draws on deliberative democratic theory to resolve the conflict, demonstrating that whether user values are legitimate to employ depends on the way labor is divided across deliberative moments.

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**1. Introduction.** Climate science often faces a “usability gap”: the available climate information does not align with the needs of stakeholders, making it unsuitable for social decision making (Lemos, Kirchhoff, and Ramprasad 2012). A burgeoning area of climate science, known as “climate services,” is attempting to close this gap by making the informational needs of users central to the provision of climate data. Increasingly, there has been a call for collaborative approaches to climate services in which the products of investigations are “coproduced” by providers (often scientific researchers) and users (the client for the service, typically a stakeholder; e.g., Brooks 2013; Hewitt, Stone, and Tait 2017). These approaches aim to help providers understand the needs, decision contexts, and values of users, thus tailoring climate information to make it more applicable.

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This development should be welcomed by philosophers of science, who recognize the role that so-called contextual values (e.g., social, political, ethical, and personal values) might play in climate science (e.g., Winsberg 2012; Intemann 2015; Steel 2016). Such views on climate science build on the more general position that contextual values may be permissibly invoked in socially relevant science under certain circumstances (e.g., Douglas 2000, 2009; Elliott and Resnik 2014; Elliott 2017). Recently, Parker and Lusk (2019) have expanded on this work to develop an account of contextual value use for climate services. Based on the inductive-risk view, the account demonstrates how climate service providers can further the usability of information by invoking the contextual values of users in unforced methodological decisions, while also helping to ensure that particularly undesirable outcomes are avoided.

At first glance, Parker and Lusk's account seems at odds with the democratic view, which is a prominent account of which values should be used in socially relevant science. On the democratic view, contextual values are legitimate in policy-relevant science only to the extent that they serve democratically endorsed ends. However, user values may, or may not, be democratically endorsed; they are just the values of those who happen to solicit climate services. Thus, the decisions made in climate services—and other coproduced forms of science—may end up being politically illegitimate according to the democratic view, even if they enhance usability.

I argue here that the invocation of user values in the provision of climate services (and similar contexts) is often politically legitimate. To make this argument, I present the positions mentioned above and then introduce a notion of political legitimacy—one that should be friendly to the democratic view—by borrowing from deliberative democratic theory. I then use climate services as an example to show that the employment of user values in policy-relevant science is democratically permissible. Bringing deliberative democratic theory into discussions of contextual values in science not only has practical import—demonstrating to climate service providers and other scientists when it is legitimate to appeal to user values in their research—but it also advances the democratic view by providing a substantive notion of political legitimacy to underwrite further development.

**2. The Inductive-Risk View of Climate Services.** Where climate information is available, it is often in a form unsuitable for social decision making. Climate services aims to remedy this problem and provide useful information about climate impacts to those who need it. Broadly defined, “Climate services involve the production, translation, transfer, and use of climate knowledge and information in climate-informed decision making and climate-smart policy and planning” (Climate Services Partnership 2015). Roughly then, a typical climate services investigation might produce projections,

trends, and economic analyses, built using national or international climate databases, that could better equip societies to adapt to climate change.

Current thinking emphasizes that climate service providers—which may be governmental agencies, universities, nongovernmental organizations, or for-profit companies—should tailor their products by collaborating with their clients or product users (e.g., Brooks 2013; Hewitt et al. 2017).<sup>1</sup> For example, Colorado River Basin managers solicited climate services from state and national agencies, who helped them create model-based projections of Lake Mead’s ability to supply water to nearby communities under a range of different climate scenarios. These projections are helping water managers create forward-looking plans, which include assessing whether securing the water supply requires building an additional water intake at a lower depth in Lake Mead (see Freeman 2016).

Parker and Lusk (2019) argue that climate services might appropriately incorporate contextual values (henceforth simply “values”) via considerations of inductive risk. Inductive risk is essentially the risk of error when reaching a conclusion or result. Such errors may take various forms, including the rejection of a true hypothesis or the acceptance of a false one, as well as the overestimation or underestimation of a quantity. There is widespread agreement among philosophers that values may permissibly be invoked in making methodological decisions when it is unclear which option would produce the most accurate results (e.g., Douglas 2000, 2009; Elliott and Resnik 2014; Elliott 2017). In such epistemically unforced decisions, scientists should consider how different options would affect the risk of error as well as the consequences that would result from those errors. If certain options might lead to errors that would have particularly negative effects given certain values commitments, those options should be avoided, while options that reduce the risk of errors with particularly negative effects should be favored (Douglas 2000, 2009).

There are various decision points in climate services where inductive risks are expected to arise, including selecting climate information sources, building or selecting impact models, and estimating uncertainties. One example from Parker and Lusk suffices to make the point: it is often uncertain which information sources are the most accurate, particularly when it comes to model projections. In such situations climate service providers face unforced methodological decisions: providers often need to choose between projections, or choose to weigh projections in some way, but epistemic considerations are often insufficient to settle the decision.<sup>2</sup> If such decisions can

1. There are also nontailored climate services, called “on-demand” services. Such services are often web portals where users can filter information using their particular circumstances. Here I focus exclusively on tailored climate services.

2. The need to choose is forced on providers because performing analyses of each projection often exceeds available resources.

be expected to have different consequences due to the different ways they might err, then that with the most acceptable consequences should be chosen. Parker and Lusk claim that when considering the consequences of their decisions, climate service providers have the same responsibilities as any other moral agent. They also emphasize that when values are used to manage inductive risks, scientists should be transparent about the roles values played in making climate service decisions, in part to help prevent misinterpretation and enable constructive scrutiny of climate research.

To flesh out the example, consider a hypothetical investigation like the Lake Mead project mentioned above. A water manager looking to create a management plan might request three different projections of the lake level based on three different future greenhouse gas emission scenarios. To provide this information, the climate service provider will likely need to select between available rainfall projections from regional climate models, since rainfall is a significant source of water for the lake. If it is unclear whether one projection is more accurate than another, the service provider may choose the model projection under each scenario that displays the most frequent drought, rather than choosing to average the rainfall across the available model projections for each scenario. The justification for this choice is that it aligns with the desire of the water manager to avoid certain particularly bad outcomes: it reduces the risk of overestimation of the available water, which could result in a disastrous water management plan.

In specifying how the inductive-risk view could help climate service providers avoid harms that their clients view as particularly bad, Parker and Lusk aimed to show how or when it is appropriate to appeal to values. When it comes to which values (or whose values) ought to be the ones employed, they assume that the users' values should serve as the tiebreaker in unforced methodological decisions. Such values are to be gleaned through user-provider consultation. Indeed, this has intuitive appeal; insofar as the provision of climate information is a service being provided to a user, it seems reasonable to suggest that the users' values are the relevant ones. Furthermore, given that scientists are hired by users, it seems they have a duty to consider the user's wishes.<sup>3</sup> As we will see, however, the incorporation of user values into climate services appears incompatible with one prominent view of values use in socially relevant research.

**3. The Democratic View of Contextual Value Use.** Although variety exists, the core of the democratic view maintains that "scientists ought to use

3. Provided that the user's values are not pernicious or unacceptable for other reasons; pernicious values should be prohibited under the general considerations that govern all moral agents (Douglas 2000; Parker and Lusk 2019). The demand for value transparency (see Elliott and Resnik 2014; Parker and Lusk 2019) would also conceivably help reduce the uptake and impact of such information should unacceptable values be used.

the appropriate democratic values—that is, the values held or endorsed by the public or its representatives” (Schroeder 2017, 1045). Intemann applies this view directly to climate research, claiming that “social, ethical, and political value judgments are legitimate in climate modeling decisions insofar as they promote democratically endorsed epistemological and social aims of the research” (2015, 219). Similarly, Elliott suggests that the science of climate skeptics, like Willie Soon, is problematic in part because the values he employed are illegitimate, representing “only a narrow range of society’s interests and priorities” (2017, 74). In short, the democratic view specifies that only values that are sanctioned by the body politic are legitimate to deploy in the kind of policy-relevant investigations and modeling endeavors that are the basis of climate services.

The motivation for adopting the democratic view stems from concerns regarding political or democratic legitimacy. Democratic view theorists contend that if values are going to be used in science that affects public policy making, then the public or its representatives should select the values (see Douglas 2005; Intemann 2015; Schroeder 2017). Considering alternatives makes this position compelling. Imagine that scientists were free to insert their own values—which may differ from that of the citizenry—when unforced methodological decisions arose in policy-relevant science. Given that the choice of values could significantly influence the results of that science, and in turn the policies that follow, scientists would have significant power over political decision making. However, scientists are not (typically) elected or formally entrusted to make decisions about which values would be socially preferable. It would thus seem that scientists have undue power in such a situation: they would have influence over part of the political process of decision making without endorsement from the public. Such influence would be politically illegitimate.

A similar situation arises when employing users’ values in climate services. “Users” could refer to anyone, including government agencies, public interest groups, private industry, or political parties, and their reasons for requesting climate information may be equally diverse. The aims or values of these groups are not typically established through democratic mechanisms that secure representative participation and are unlikely to be indicative of the general public’s desires. Yet, the information that climate service providers supplies to users is typically designed to be useful for social and political decision making. According to the democratic view, then, the employment of users’ values in climate services would often be illegitimate, and scientists should ignore these values in favor of democratically endorsed ones, to ensure users do not have undue influence over social decision making.

**4. Deliberative Democracy and Political Legitimacy.** As is noted above, democratic view theorists specify that “democratic mechanisms” (Intemann

2015) or democratic “representativeness” (Elliott 2017) should be employed to adjudicate legitimate from illegitimate value use in policy-relevant science. It is somewhat surprising, then, that these theorists offer little explication of the structure of these democratic mechanisms or forms of representativeness.<sup>4</sup> What is offered by such theorists (almost universally) are examples of projects that engage stakeholders, often to demonstrate that stakeholder input into policy-relevant science is not so onerous as to be impractical.

For instance, Elliott (2017, chap. 7) provides examples of three types of engagement: bottom-up engagement, often associated with citizen participation or science-directed activism; top-down engagement, in which organizations employ formal mechanisms to solicit opinion; and interdisciplinary engagement, which brings together diverse groups of scholars. Similarly, Intemann (2015) employs examples of stakeholder engagement through community-based advisory boards on certain topics, like HIV/AIDS research.

It is often unclear, however, whether employing the values gathered through these forms of public engagement actually achieves legitimacy. As Elliott points out, citizens engaging with participatory science often do so out of special personal interest in particular topics, and they may hold views that do not align with the general public. Douglas (2005) notes several difficulties that arise when selecting representative groups for participation in publicly engaged science. Furthermore, employing the values that result from these public procedures in place of scientists’ values seems to merely switch one stakeholder’s preferences for another. Schroeder (2017) demonstrates how scientists—especially those working in socially relevant areas of research—are often well informed and passionate about the implications of their own science, never mind personally and professionally affected by public perceptions of their trustworthiness. Scientists therefore are themselves stakeholders. Public engagement needs to be properly structured to secure political legitimacy; otherwise, using the results of participatory mechanisms in policy-relevant research might merely swap one set of nondemocratically endorsed values for another.

The democratic view seems correct to claim that engaged or participatory science reduces the power that scientists or individual users have over value decisions, but it falls short of demonstrating that the engagement described above meets the view’s stated goal. The goal is to make policy-relevant science politically legitimate by removing undue and improper influence, but democratic view theorists have not given an account of political legitimacy on which to judge their suggestions. To fully articulate the permitted roles of

4. This lack of explication is often acknowledged (see Intemann 2015; Elliott 2017). Douglas (2005) and Kitcher (2011, 222–24) anticipate the turn to deliberative democracy when they discuss attempts by political scientists to reach deliberative consensus in practice.

value-influenced science, democratic view theorists must embrace a substantive notion of political legitimacy. Fortunately, I believe there is one tailor fit to their account.

Deliberative democracy is a view of political organization and legitimacy in which the process of reason giving, within suitably structured deliberations, is required and central. Deliberations on this view are interactions that permit reflections on preferences, values, and interests without threat from coercion (see Dryzek 2002; Mansbridge et al. 2010). For deliberative democrats, the outcomes of such deliberations are binding for those who participate as well as those whom the participants represent. Thus, deliberation is the mechanism by which political decisions are arrived at and legitimated.

The goal for deliberative democracy is to permit deliberators to realize the common good by reasoning together about the nature of their preferences and how they might be brought to serve public-minded ends (see Gutmann and Thompson 1996, 2004). Participants in deliberation advance positions that are compelling and persuasive to others and that “can be justified to people who reasonably disagree with them” (Gutmann and Thompson 1996, 2). That is, rather than maximizing personal utility, participants aim to reason about the public good by offering reasons others can recognize. Matters of public concern are then settled through deliberation by appealing to “the authority of the better argument” (Habermas 1962/1991, 36). Ideally, deliberation would end in convergence on one position, but such convergence is not needed for legitimacy. If there is nonconvergence, outcomes can be legitimated by voting among the alternatives deliberated on, or some other means, so long as the ideals of deliberative democracy are upheld.

There is near consensus among deliberative democrats regarding many of the ideals that should regulate deliberation (Mansbridge et al. 2010). Although not an exhaustive list, deliberation should promote fairness, reciprocity, equality, and absence of coercion. In short, these ideals indicate that participation in deliberation should be open to all those who have an interest in the decision, those participating should give equal concern to each other and the reasons each offers, participants should have equal standing in the deliberation, and the deliberation should proceed absent the threat of force. Given that these ideals are regulative, the greater the extent that they are enacted, the more legitimate the result.

Deliberative democracy provides reasons that vindicate democratic view theorists’ claims that engaged scientific efforts might increase legitimacy: such efforts involve the exchange of reasons that strive toward public ends. In addition, deliberative democratic theory offers ways of structuring engaged research. The ideals of deliberative democracy indicate which factors to control in science-related deliberation to help ensure high quality and political legitimacy; this could help specify the structure of engaged science. Deliberative democratic theorists have also developed mechanisms for

deliberation that make it feasible for public decision making, including the use of minipublics and deliberative polling (see Smith 2009), which may help address many of the shortcomings democratic-view theorists recognize in their examples of engaged science. Some democratic-view theorists have already appealed to such mechanisms to show the benefits of public engagement (Douglas 2005; Kitcher 2011). Deliberative democracy not only has a lot to offer those concerned with the legitimate use of values in science, but it can help show where and when user values can be permissibly appealed to.

**5. Contextual Values in Deliberative Moments.** One useful concept deliberative democracy has to offer the democratic view is the deliberative moment. On the systems view of deliberative democracy, deliberation is functionally divided into different components or moments, each of which contributes differently to matters of public concern. These moments may have different modes of deliberation, styles of reasoning, or venues or engage different deliberators. A democratic society is filled with these deliberative moments, and the way they are arranged can be crucial to its success. Moments might be sequentially arranged, with the order of the moments enhancing deliberative value across the system, or the moments might be iterative, such they allow for revisiting or scrutinizing previous decisions. The systems approach recognizes that democracy requires a division of labor, and in dividing that labor, deliberation may take on many different roles (see Moore 2016).

Examining these different deliberative moments reveals that in some moments, policy-relevant science is the topic of deliberation, and in others, policy-relevant science can be offered as reasons in support of deliberators' views. At least in the latter, climate services could play a role, and in such a context user values would be politically legitimate.

Take one deliberative moment democratic view theorists highlight: establishing aims for policy-relevant science (see Intemann 2015). In such a moment, how science should support policy is the topic of deliberation. One can imagine this in the context of the Lake Mead case: a representative body is formed to deliberate on how water management research in the Colorado River Basin should be done. The deliberative body concludes that research should focus on worst-case scenarios to protect human livelihood. Thus, when providers are forced to choose between available rainfall projections, the only legitimate choice is the worst-case scenario. Given the outcome of this deliberative moment, climate service providers should abide by the outcome of deliberation and use the democratically endorsed values, regardless of what any particular stakeholder may ask for.

But deliberations about the aims of science are not the only deliberative moment when science is policy relevant, and such moments may be rare. Another deliberative moment is social agenda setting, that is, determining what

social and political tasks should be pursued. For example, one can imagine regional planners consulting stakeholders in a town meeting to help establish policy priorities. These deliberative moments are clearly policy relevant, in that they set which policies to pursue. Scientific results are often offered in such moments as reasons in support of particular priorities. In these deliberative moments user values are legitimate to employ.

When stakeholders enter into deliberation about political agendas, they bring with them views of what is good for the polity that are often not fully formed, nor are they known to other deliberators (Mansbridge et al. 2010). The goal of deliberation is to reflect together on such views through reasonable examination, offering constructive criticism and refinement, in the hope of reaching something acceptable to all. To do so, deliberators need to examine the information each brings to the discussion, what exactly their own values and interests are, and how those values and interests might affect others. Scientific information can thus serve as an input into the deliberation process; it can be deployed as a reason in deliberation and can be used by deliberators to understand their own perspectives and those of others.

It is not hard to see how climate services that employ user values could be central to agenda-setting moments in a deliberative democracy. Let us again return to the water-management example. One can imagine regional planners deliberating with stakeholders about their policy agenda. Some stakeholders might advocate for building a low-level intake in Lake Mead by presenting a risk assessment based on worst-case rainfall projections, an assessment appealing to their own values. Of course, some other stakeholders might want to prioritize a different project, perhaps investing in the agricultural sector to build efficiencies. This group might employ a similar analysis but using a weighted average of all of the available projections, arguing that under that scenario their preferred priorities may realize near-term benefits to the agricultural sector that will alter the need for another intake. Or, environmentally minded persons might present another similar analysis built on a best-case rainfall projection, arguing that investing in climate mitigation, rather than adaptation, will produce the best outcomes. User-informed scientific results are the informational basis on which deliberation may proceed: they can help one understand one's own position and represent the consequences to others during deliberation.

What the above hypothetical example demonstrates is that there are deliberative moments when user values can be legitimately deployed in policy-relevant science: there is no undue influence on the part of climate information users. Such information can play a very important role in legitimizing other social and political decisions in a deliberative democratic structure, by providing necessary information for deliberation and for serving as reasons that help support the views of deliberators. So long as the values employed are made transparent in deliberation, there is no need for those values to be

democratically endorsed by the polity. User guided climate services, and other sciences, can be useful inputs into politically legitimizing deliberations.

Some might object to the above argument, claiming that the existence of these deliberative moments does not legitimize the use of nondemocratically endorsed user values. After all, deliberative democracy maintains that deliberators should offer views that other deliberators would accept in reasoning toward some common good. The kinds of values that fulfill this vision are those widely accepted among the polity. This wide acceptance is just shorthand for democratic endorsement. Therefore, value-laden science, even in these deliberative moments, should use democratically endorsed values to further the ideals of deliberative democracy.

There are two responses to this objection. The first is that self-interest has a role to play in deliberation and that this legitimizes the deployment of user values in certain deliberative moments. That a policy will hinder or further one's interests is important information in deliberation, and thus, science employing user values can help demonstrate policy consequences to deliberators. Indeed, deliberative democratic scholars have claimed that, even when focused on the common good, "the exploration and clarification of self-interest must play a role" and that deliberation with self-interests made manifest can reduce the possibility of exploitation, result in creative solutions, and provide a better understanding of the common good (Mansbridge et al. 2010, 72). Appealing to user values in epistemically unforced scientific decisions could further these aims, provided that demands of transparency are respected.

A second response would point out that employing democratically endorsed values in all deliberative moments could hinder using sciences like climate services for democratic scrutiny. For example, it is not hard to imagine a democratically endorsed regime that employs the values of business interests in environmental planning. The need to build a resilient water-management plan may not even be on the political radar, because in such a political regime using optimistic climate projections is commonplace. In such a case, environmental groups might solicit an assessment of regional water capacity using the worst-case rainfall projections to demonstrate potential harms obscured by employing the regime's preferred values. This assessment would explicitly employ nondemocratically endorsed values in order to scrutinize the dominant agenda and the widely accepted values on which it is based. In doing so, the group might hope to broaden the base of concerned stakeholders and open a new evaluative deliberative moment. Therefore, in the view of a predominant account of democratic legitimacy, value use in scientific decisions—including those made in climate services—can be politically legitimate even when they do not respect democratically endorsed aims or values.

**6. Conclusion.** On the face of it, it looked as if the democratic view was at odds with a newly developed account of value use in climate services. The

former required unforced methodological decisions in policy-relevant science to be settled by appeals to democratically endorsed values, while the latter permitted the employment of values held by particular information users. What I have shown—by expanding on the democratic view using the systems approach to deliberative democratic theory—is that different deliberative moments legitimately permit the use of nondemocratically endorsed values in scientific decision making. Furthermore, the legitimacy of employing contextual values in unforced methodological decisions is dependent on the way labor is divided among deliberative moments within a democracy.

The appeal to deliberative democracy made here is just a first step toward a more democratically engaged science. It encourages democratic theorists to look ahead to questions regarding the role of scientific information in deliberation, how to structure science-related deliberations so they fulfill deliberative ideals, and how to address inequities in deliberation caused by unequal access to scientific information among deliberators. The upshot of my analysis is that it provides a richer view—and a promising agenda—for both democratic view theorists and climate service providers. Climate service providers now have additional resources to support collaborations in their investigations, whereas philosophers interested in values in science have a new toolkit, borrowed from deliberative democratic theory, with which to work.

## REFERENCES

- Brooks, Mark S. 2013. “Accelerating Innovation in Climate Services: The 3 E’s for Climate Service Providers.” *Bulletin of the American Meteorological Society* 94 (6): 807–19.
- Climate Services Partnership. 2015. “What Are Climate Services?” *Climate Services Partnership* (blog). <http://www.climate-services.org/about-us/what-are-climate-services/>.
- Douglas, Heather. 2000. “Inductive Risk and Values in Science.” *Philosophy of Science* 67 (4): 559–79.
- . 2005. “Inserting the Public into Science.” In *Democratization of Expertise?* ed. Sabine Maasen and P. Weingart, 153–69. Dordrecht: Springer.
- . 2009. *Science, Policy, and the Value-Free Ideal*. Pittsburgh: University of Pittsburgh Press.
- Dryzek, John S. 2002. *Deliberative Democracy and Beyond: Liberals, Critics, Contestations*. Oxford: Oxford University Press.
- Elliott, Kevin. 2017. *A Tapestry of Values: An Introduction to Values in Science*. Oxford: Oxford University Press.
- Elliott, Kevin, and David B. Resnik. 2014. “Science, Policy, and the Transparency of Values.” *Environmental Health Perspectives* 122 (7): 647–50.
- Freeman, Jennifer. 2016. “Climate Models Help Stakeholders Make Billion-Dollar Water Decisions in Colorado Basin.” NOAA Climate.Gov, May 31. <https://www.climate.gov/news-features/climate-case-studies/climate-models-guide-billion-dollar-water-infrastructure>.
- Gutmann, Amy, and Dennis Thompson. 1996. *Democracy and Disagreement*. Cambridge, MA: Belknap.
- . 2004. *Why Deliberative Democracy?* Princeton, NJ: Princeton University Press.
- Habermas, Jürgen. 1962/1991. *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*. 6th ed. Cambridge, MA: MIT Press.
- Hewitt, Chris D., Roger C. Stone, and Andrew B. Tait. 2017. “Improving the Use of Climate Information in Decision-Making.” *Nature Climate Change* 7 (9): 614–16.

- Intemann, Kristen. 2015. "Distinguishing between Legitimate and Illegitimate Values in Climate Modeling." *European Journal for Philosophy of Science* 5 (2): 217–32.
- Kitcher, Philip. 2011. *Science in a Democratic Society*. Amherst, NY: Prometheus.
- Lemos, Maria Carmen, Christine J. Kirchhoff, and Vijay Ramprasad. 2012. "Narrowing the Climate Information Usability Gap." *Nature Climate Change* 2 (11): 789–94.
- Mansbridge, Jane, James Bohman, Simone Chambers, David Estlund, Andreas Føllesdal, Archon Fung, Cristina Lafont, Bernard Manin, and José Luis Martí. 2010. "The Place of Self-Interest and the Role of Power in Deliberative Democracy." *Journal of Political Philosophy* 18 (1): 64–100.
- Moore, Alfred. 2016. "Deliberative Elitism? Distributed Deliberation and the Organization of Epistemic Inequality." *Critical Policy Studies* 10 (2): 191–208.
- Parker, Wendy S., and Greg Lusk. 2019. "Incorporating User Values into Climate Services." *Bulletin of the American Meteorological Society* 100 (9): 1643–50.
- Schroeder, S. Andrew. 2017. "Using Democratic Values in Science: An Objection and (Partial) Response." *Philosophy of Science* 84 (5): 1044–54.
- Smith, Graham. 2009. *Democratic Innovations: Designing Institutions for Citizen Participation*. Cambridge: Cambridge University Press.
- Steel, Daniel. 2016. "Climate Change and Second-Order Uncertainty: Defending a Generalized, Normative, and Structural Argument from Inductive Risk." *Perspectives on Science* 24 (6): 696–721.
- Winsberg, Eric. 2012. "Values and Uncertainties in the Predictions of Global Climate Models." *Kennedy Institute of Ethics Journal* 22 (2): 111–37.