PAPER

Advancing a transformative social contract for the environmental sciences: From public engagement to justice

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Abstract

Taking as a starting point Jane Lubchenco’s call for a renewed social contract for environmental science, this paper advances a framework for science’s place in society in which justice is central. A social contract is a desired vision of social order that distributes rights, responsibilities, and obligations among political actors. The magnitude of global ecological change, our collective inability to address ecological crises, and populist challenges to science have renewed interest in debates about existing social contracts with science. While Lubchenco’s vision of a social contract focuses on practical ways to improve the engagement of scientists with decision-makers and citizens, we argue that to achieve the objectives laid out by Lubchenco, justice—encompassing representation, distribution, and recognition—must be at the core of science-society relations. A justice-centred social contract with science requires acknowledgement on the part of scientists, administrators, decision-makers, and citizens of the biases, inequalities and inequities contained within and advanced by academic institutions. Orienting science towards justice provides a starting point for a more diverse, inclusive, and equitable culture of publicly-funded research.

1. Introduction

The magnitude of change required to achieve socio-ecological sustainability and address climate change has prompted a renewed interest in debates about social contracts between science and society. While the social contract has a long history in Euro-western political thinking, the modern usage of the term emerged as part of the Enlightenment project, articulated in the writings of Thomas Hobbes, John Locke, Jean-Jacques Rousseau, Immanuel Kant, among others. While differences exist among these varied accounts, a unifying theme is the idea that democratic governance requires free individuals to make a consensual compact to limit certain freedoms in exchange for the security and benefits offered by governing bodies. It may appear rather ironic in retrospect that equivalent discussions did not also take place during the emergence of Western science regarding the need for a social contract to be envisioned between science and society. Today, however, it has become quite clear that the authority of scientific knowledge and its brokers must rest upon the legitimacy ascribed by the citizens whose lives will be impacted by that knowledge and the decisions it informs.

Since its genesis in the United States in the mid-twentieth century, the social contract with science has become an influential framework for academics, politicians, and citizens to discuss issues related to responsibility, accountability, and legitimacy in publicly-funded research. Appeals to revisit and revise the social contract with science point to the insufficiency of conventional approaches to science for societal problem-solving. One approach targets the need for improvements in scientific participation and communication with decision-makers and publics (Lubchenco 1998, Lubchenco et al. 2015, Lubchenco 2017; see also Arnott et al. 2020, Hooke 2015, Hoyningen-Huene et al. 1998). Others call for deeper and more fundamental changes to science (Jasanoff 2003, Castree 2016). In line with calls for more fundamental changes to science, we argue that efforts to enhance scientists’ participation with society are necessary but insufficient to meet the current needs of social welfare and ecological sustainability. Required is a more fundamental shift in the social contract with
science where justice is granted a more central standing. While justice has been mentioned as an outcome of a revised social contract with science (e.g. Lubchenco 1998), justice has yet to inform visions of a social contract that promote changes within science.

Based on extensive literature in environmental justice and feminist philosophy, we define justice as encompassing three dimensions: (1) representation, by which we mean demographic diversity within science; (2) distribution, which refers to parity-seeking efforts to allocate resources equitably within scientific institutions; and (3) recognition, which refers to reflexive integration of plural ways of knowing and being in the world to ensure inclusion. For these dimensions, we draw on previous work which outlined how a justice-framework can inform public participation with science (Blue et al 2019). In keeping with existing discussions about social contracts with science (in particular, Bush 1945, Lubchenco 1998), this article focuses specifically on publicly-funded science, although a justice framework also offers insights for industry, NGO, and citizen-based scientific endeavors.

Situating justice at the heart of the social contract with science is timely and urgent. Recent civil society protests over issues such as climate change and COVID-19 demonstrate in sharp relief what environmental justice and feminist scholarship and activism have evidenced for 40 years: that struggles for ecological sustainability are ultimately struggles for justice. In turn, the recent rise of anti-intellectual, right-wing populist movements across the globe, and their attendant denial of science, illustrates that the inequitable distribution of resources between scientific elites and lay-people extend to manipulation of knowledge pertaining to some of the most salient political issues of our time. Meanwhile, in response to recent Black Lives Matter protests, scientific institutions have made public-facing commitments to address racism, sexism, and other forms of discrimination within scientific institutions. While addressing these challenges requires the mobilization of scientific research, we propose that significant reforms are also warranted in how that science is produced, in order to align research with emerging public values.

2. A social contract for science: background

The social contract that dominates science-society relations emerged in the United States after World War II, and was subsequently embraced across Europe and Asia (Demeritt 2000, Slaughter and Rhoades 2005). As exemplified in Vannevar Bush’s influential report ‘Science, The Endless Frontier’ (1945), this contract cemented a vision which legitimized the autonomy of science, the use of public funds to support science, and the expectation of public deference to the recommendations of science. Notably, Bush’s report argued for the separation of science from society to maintain objectivity and credibility, and to ensure that political interests do not sway publicly-funded research. Bush’s report fostered the reorganization of scientific systems in the post-war United States, and established widely-held tenets that remain in place today, such as the insulation of scientists from social critique, alongside the perceived neutrality and objectivity of science in which facts are separate from values. Notably, the former and explicitly not the latter are positioned as the purview of science.

Various changes later in the twentieth century revealed the limitations of this social contract, in particular the assumption that social benefits inevitably accrue as an outcome of the production of science, and that science and scientists are separable from society and politics. These changes include the recognition of the influence of the military and the business/industrial sector on scientific research, high-profile instances of misconduct, discrimination, and harassment within science, and revelations of negative impacts resulting from the uptake of scientific/technological developments (e.g. pesticides) (Guston and Keniston 1994, Krishna 2014). Meanwhile, civil society actors, excluded from scientific knowledge production by virtue of the conventional social contract, demanded more opportunities to engage with, examine, and interrogate scientific claims (Gibbons 1999). In sum, science was no longer afforded the prestige or public confidence that it previously enjoyed.

Symptomatic of these changes, renewed interest emerged among academics in revising the social contract with science. While some argued that the very concept of a social contract should be discarded (e.g. Frodeman and Mitham 2000), others highlighted the importance of reforming the social contract with science to account for the permeability of boundaries among science, government, industry, and society (Ravetz 1988, Gibbons 1999, Guston 2000). The key challenge facing science was that its political legitimacy could no longer be assumed in advance: as Guston and Keniston highlighted, ‘the scientific community needs to reach out to justify its claim on public resources by demonstrating where and how it is relevant in solving public problems’ (1994, p. 32). In short, the question is not if but how scientists engage with broader societal actors.

3. A new social contract for environmental science: From autonomy to engagement

In the late 1990s, Lubchenco gave a presidential address to the American Association for the Advancement of Science outlining the need for a new social contract for environmental science in order to realize the social benefits derived from publicly-funded research (Lubchenco 1998). In her view, scientists...
have a responsibility to re-examine goals, priorities, and actions given that ‘the world at the close of the 20th century is a fundamentally different world from the one in which the current scientific enterprise has developed’ and, as such, ‘business as usual will not suffice’ (1998, p. 492). She emphasized that the roles of science to ‘discover, communicate, use knowledge, train next generations’ have not changed; rather, what have changed are the needs of society (ibid, p. 492). In her view, these changing social needs warrant a new social contract in which scientists share research findings with broader constituencies, listening as well as providing advice, particularly to address problems that might not have been within the purview of pre-existing academic priorities. In subsequent work, Lubchenco clarified that science should not dictate action, but it should be at the policy table to provide ‘available, understandable, usable, credible’ information for citizens and decision-makers (2017, p. 97).

Lubchenco’s vision of a revised social contract in which environmental science is invested in sharing information, listening to public needs, and clearly justifying its use of public resources has had wide resonance and appeal, particularly among academics concerned with how to reduce the gap between the production of environmental research and its use by decision-makers. Her intervention has inspired several initiatives over the past few decades to enhance participatory approaches within science (Rapley and De Meyer 2014), and promote solution-driven, action-oriented research (Defries et al 2012), facilitated through changes in funding structures (Arnott et al 2020). In turn, scientists have recognized the need to show more appreciation for public-funding and citizen support (Hooke 2015), and to communicate the benefits that scientific research offers to society (Hoyningen-Huene et al 1998).

The vision of an engaged and appreciative environmental science focused on solution-driven research and mutual benefit masks two fundamental problems, however. First, while emphasizing the benefits that publicly-funded research can deliver for society, Lubchenco sidestepped discussions about the incursion of military, corporate, and applied interests in the shaping of priorities and practices within certain streams of environmental science. Consider, for instance, the ways in which Cold War state funding for the geosciences and global environmental monitoring was driven by military intelligence ambitions under a broader surveillance imperative (Doel 2003). Or, consider the ways in which academic research and governance more broadly is tacitly shaped by the ‘Triple Helix’ of university-industry-government partnerships through which innovation and commercialization have become increasingly integral (Etzkowitz and Leydesdorff 2000). Writing in the context of the United States, Rhodes (2006, p. 47) argued that declining government support for academic research has meant that more pressure is placed on scientists to ‘focus on what corporate sponsors will subsidize.’ Raising similar concerns about publicly-funded research in the United Kingdom, Demeritt (2000) claimed that academic values are increasingly instrumentalized, as salary, promotion and prestige are tied to research grants in which (neoliberal economic) policy relevancy is central. In Demeritt’s view, this linking of academic research to industry and policy relevancy encourages ‘safe’ research that ensures the flow of material resources, at the expense of research that challenges the economic and political status quo.

The second problem facing this vision of an engaged, solution-driven environmental science lies with the deep challenges associated with reconciling the practices of scientific institutions with the requirements of democracy and the concerns of civil society. For instance, Lubchenco claimed that science should ‘frame the questions to be posed, provide assessments about current conditions, evaluate likely consequences of different policy or management options, provide knowledge about the world, and develop new technologies’ (1998, 495). By retaining the implicit authority of scientific knowledge to shape the meaning of public issues, this prescription reproduces assumptions that current practices within scientific institutions are unproblematic, and that environmental scientists are in the best position to identify and resolve issues of public concern. As we will discuss in more detail, these assumptions do not stand up to scrutiny, particularly when viewed through the lens of existing inequalities and inequities within academia.

4. Transforming the social contract for environmental science: From engagement to justice

In light of calls for improved public engagement on the part of environmental scientists to strengthen and promote the political legitimacy of science, alternative approaches call for more fundamental changes to the cultures of science to ensure reflexivity and accountability with respect to the factors and forces underpinning research agendas, knowledge production, and data interpretation (Ravetz 1988; Jasanoff 2003, Seidel et al 2013, Rapley and De Meyer 2014, Castree 2016). For instance, in an article written a few years after Lubchenco’s call for a new social contract for environmental science, Jasanoff (2003) made a plea for ‘technologies of humility’ for the environmental sciences, including attentiveness to unforeseen findings, accommodation of uncertainty and ignorance, recognition of normative assumptions embedded within technical decisions, and consideration of plural viewpoints.

Drawing on and extending these calls for change within science, we outline the contours of a social contract with environmental science informed by a
tripartite account of justice comprised of representation, distribution, and recognition.

Representation refers to processes and procedures to ensure demographic parity in the environmental sciences. Evidence overwhelmingly shows that environmental science institutions and organizations in North America and Europe suffer from a lack of diversity (Arismendi and Penaluna 2016, Adams et al 2014, Pearson and Schuld 2014, Kern et al 2015, Faria et al 2019). Most efforts to date have focussed on addressing and remediating gender inequality (e.g. Arismendi and Penaluna 2016, Kern et al 2015, Thornbush 2016, Grogan 2019), although efforts are increasingly directed at enhancing racial and ethnic diversity in science (Faria et al 2019). While significant gains have been made in terms of increasing diversity at undergraduate and graduate levels, progress in enhancing faculty diversity in environmental science has been slow (Thornbush 2016). In part, low diversity can be tied to unwelcoming workplace cultures marked by harassment and discrimination towards women and other minority groups (NAS 2018).

Distribution refers to parity-seeking efforts that seek an equitable allocation of resources and power within environmental science institutions. Maldistribution can occur when resources, such as salaries, research funding, and benefits such as power and privilege, disproportionately accrue to certain groups at the expense of others. Maldistribution of resources can take shape within and among the various disciplines comprising the environmental sciences, as well as between science, industry, and civil society. For instance, it is well-documented that resources are inequitably distributed in the environmental sciences, evidenced by gender gaps in income and research funding, as well as membership on journal editorial boards, citation counts, awards, and so forth (Grogan 2019). Some argue that income inequalities are increasing as a result of the neoliberalization and corporatization of universities which increasingly prioritize commercializable research at the expense of other types of inquiry (Folk-Dawson 2019). Consider, for instance, how state and corporate funding is often directed towards technical applications such as GIS, remote sensing, artificial intelligence, and genomics, in ways that can marginalize more socially-oriented research and ways of knowing (Castree 2016).

Recognition refers to reflexive (i.e. thoughtful and considered) integration of plural ways of knowing into environmental sciences. Misrecognition points to persistent inequities of social status and the institutionalized patterns, structures, and policies that produce and sustain these inequities. Misrecognition can occur when marginalized groups are stereotyped or when the knowledge, practices, and experiences of particular social groups are devalued, dismissed, or ignored entirely (Fraser 2013). For instance, women and other minority groups have long struggled for acceptance and recognition of their contributions in the environmental sciences, and particularly in male-dominated arenas such as physical geography and geosciences (Thornbush 2016). Misrecognition can also take place when certain ways of knowing—such as qualitative social sciences and humanities or traditional ways of knowing—are dismissed, ignored, or undervalued in academic environments. Although it is increasingly recognized that views from multiple disciplines and ways of knowing are required to address current social and ecological problems, in practice academic institutions tend to favor and promote quantitative, statistical methods over other forms of inquiry (Seidel et al 2013; Rapley and De Meyer 2014, Castree 2016).

For analytic purposes, we present these three dimensions of justice (representation, distribution, recognition) separately. In reality, they are interconnected and intertwined. Inequities and inequities in science are the outcome of unjust political, economic, social, and cultural systems, and the driving forces of inequality in the environmental sciences are broad, complex, and long-standing. For instance, many commentators have observed that the environmental sciences are racialized by a normalization of whiteness, a term which refers to the ‘normative, ordinary power to enjoy social privilege by controlling dominant values and institutions, and, in particular by occupying space within a segregated social landscape’ (Kobayashi and Peake 2000, 393, Baldwin et al 2012, Mclean 2013). Whiteness informs which people are assumed to be experts on environmental issues, which knowledge is produced, whose interests are served, which actions are recommended, and ultimately, whose visions of the environment are upheld and promoted. Acknowledging the privileges that accrue to certain people because of whiteness also means coming to terms with the ways in which the environmental sciences are intimately entangled with colonial histories and politics (Erickson 2018).

Re-orienting a social contract for the environmental sciences according to these dimensions of justice can steer research toward better alignment with values of equity, diversity and inclusion, and, in turn, facilitate the production of research that is more aligned with social needs. Without attention to justice, social contracts with science risk perpetuating oppression and inequality for some groups while unfairly advantaging others. It bears emphasizing the principles of reciprocity, mutual benefit, and responsibility inherent to the idea of a social contract have not applied uniformly across all social groups (Pateman and Mills 2007). Consider that slavery, the domination of men over women, and the expropriation of Indigenous land and culture have all taken place
under social contracts committed to liberal democratic values of equality for all. Such oppressions were often validated and legitimized by scientific authority.

5. Implementing a justice-oriented social contract with science

In extending Lubchenco’s influential vision of an engaged environmental science, we argue for a more expansive vision of a social contract for environmental science in which justice is central. Dimensions of justice—such as representation, distribution and recognition—provide focal points for academic institutions to turn attention inward to interrogate and, where necessary, transform practices, values, and assumptions informing the production of knowledge. We invite consideration of how benefits, privileges, resources, legitimacy, and authority are distributed within and beyond academic institutions. Whereas previous social contracts with science assumed that public benefits accrue when science is separate from society, a transformed contract situates environmental science squarely within social, political, economic, and historical contexts. Contextualizing environmental science in such a way reveals that the inequities and power imbalances that inhere in society also shape the practices and outcomes of academic science.

In practical terms, implementing justice requires not only vision and problem-recognition, but also long-term strategic action and financial investment on the part of academic administrators and government funding agencies (Mcarthur and Ashwin 2020). Calls for change and concrete actions are already taking place within academic institutions, and include, but are not limited to:

- Mechanisms to report and respond to discrimination and harassment, including a readiness to terminate funding to individuals and institutions that do not comply with discrimination legislation;
- Codes of conduct, with mechanisms for enforcement, that outline acceptable and unacceptable behaviour for workplace interactions, academic conferences, and field schools;
- Concerted and consistent efforts to recruit, mentor, retain, and support women and minority groups across all ranks of faculty and leadership;
- Concerted efforts to teach (and learn about) histories and contemporary practices of systemic discrimination such as racism and sexism;
- Institutional support for research and education into causes and experiences of inequality and inequity in environmental sciences;
- Implementation of critical reflection in environmental science curriculum about the values and biases that infuse and inform scientific knowledge production and application;
- Cultivation of humility about the limitations of quantitative science, and its ambitions for prediction and control;
- Recognition of, engagement with, and inclusion in environmental decision-making of diverse ways of knowing, including the interpretive social sciences and humanities.

Although we offer some ideas for practical action, our contribution is primarily conceptual and normative insofar as we seek to inform a richer array of possibilities for environment knowledge production. We do not imply that environmental science is unnecessary or that it is irrelevant for decision-making. Rather, we highlight that transformations are required in the conduct and practice of academic science.

In sum, recent calls for change within and outside of academic institutions suggest that the contours of a justice-oriented social contract with science are already taking shape. In response to these demands, environmental scientists and academic institutions more generally must ensure that justice is central to the ways in which research is conducted, courses are taught, students are trained, and knowledge is implemented. Situating justice at the heart of a transformed social contract with environmental science would enhance the legitimacy and improve the quality of publicly-funded research by fostering fairness, inclusivity, diversity, equity alongside a deeper appreciation of the importance of different ways of knowing and being in the world.

Data availability statement

No new data were created or analysed in this study.

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