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VIEWPOINT



Transforming environmental research to avoid tragedy

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ABSTRACT

According to a recent article in this journal, the failure of policy action on climate change despite scientific consensus points to a broken science–society contract. To avoid this ‘tragedy of climate science’, the authors call for a moratorium on its production. As scholars of, and participants in, global science–policy interfaces, we recognize the authors’ assumptions and reasonings but also see an urgent need for a deeper understanding of the current limitations of environmental research, and the challenges of connecting knowledge to policy and society. Rather than a blanket moratorium, we argue that what is needed is a profound transformation of environmental research. This entails a shift in research priorities towards currently marginalized approaches in social sciences, humanities and participatory research, to generate a much-needed understanding of obstacles to action and just and equitable strategies for overcoming them with due consideration of issues of justice and equity. We also propose a new science–society contract that recognizes the politics of environmental knowledge. This is necessary to enable critical reflection on what interests environmental research serves whose knowledge needs are excluded, and with what consequences. We recognize that our proposal can be uncomfortable and that it challenges deeply held beliefs in the neutrality of science. However, deep reprioritization in environmental science and science policy are urgently needed to strengthen the contribution of environmental research to the transformative changes that it calls for.

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Introduction

Noting chronic political inertia despite consolidated scientific understanding, and warnings, that humans are facing environmental disasters of global dimensions, Glavovic et al. (2022) ask if scientists should continue in the same track, ‘provid[ing] ever more data, novel collaborations and forms of outreach, and participate in more marches and petitions, hoping that governments will respond to the scientific consensus, mounting impacts and growing urgency for action?’ They propose a moratorium on climate change research production ‘as a means to first expose, then reconfigure, the broken science–society contract’ (p. 1). The moratorium should remain in place ‘until governments are willing to fulfil their responsibilities in good faith and urgently mobilize coordinated action from the local to global levels.’ This, they continue ‘offers the only real prospect for restoring the science–society contract’ (p. 4).

Indeed, adequate steps are not being taken to catalyse the needed transformative changes in society, politics and economy and we agree that this raises important questions for environmental research. In this rejoinder article, we engage Glavovic et al.’s problem analysis and their proposal for a moratorium. As scholars of, and participants in, global science–policy interfaces, we recognize many of the underlying assumptions and reasonings in the article and we concur that doing more of the same is not an option. But we do not think that research has done all that is needed for action.

Quite to the contrary, we believe that there is an urgent need for an improved understanding of science–society relations and the challenges of science–policy interfaces, and for a more in-depth discussion of how environmental research can and should respond to these challenges.

Drawing on existing literature and our own research, we offer an alternative analysis of the current situation that is both more critical of existing environmental research and more optimistic about its potential to contribute to sustainability transformations. We argue that inaction on climate change is not just a tragedy that happens to academic researchers; they themselves play a part in the politics and tragedy that they discuss. Instead of *stopping* research, we, therefore, suggest *transforming* it to enhance its potential to support sustainability transformations. This requires profound adjustment in research priorities, approaches, and associated values. It is vital to expand current knowledge if we are to enable new ways of relating to other humans, animals and to nature. That includes expanding our view of *what counts as knowledge*, such that we can learn better from the knowledge of a variety of citizens, Indigenous peoples, professionals, practitioners and local communities.

After an initial discussion of the merits and risks of the suggested moratorium, we offer a critical evaluation of current research priorities and their implications. We argue that research can strengthen its contributions to better support societies in making the needed transformations towards sustainability, but that this requires a fundamental rethinking of the science–society contract.

The merits and risks of a moratorium on research

The suggestion that researchers and global environmental assessment bodies like the Intergovernmental Panel on Climate Change (IPCC) or the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), pause for a bit is worth considering. Not because it might pressure decision makers – which we doubt – but for the space it would offer the scientific community to reflect on the current situation and on their priorities. A moratorium could – and should – encourage researchers to take stock and open-mindedly reflect on the value of more of the same.

First, there is increasing recognition of the problems with the current productionist paradigm in academia. Global Environmental Assessments literally cannot keep up with the exploding volume of scientific output (Callaghan et al., 2020). This results in innumerable hours of both paid and unpaid work by scientists to synthesize the vastly growing scientific literature and it induces a need to select, leaving greater space for selection that is likely to reinforce existing biases towards natural sciences, publications in international journals and in the English language (Callaghan et al., 2020). The frantic pace induced by current scientific and assessment processes leaves too little time for deeper thinking and reconsideration of the underpinning assumptions, and for taking stock of the benefits and efficacy of the current systems.

Second, the space for reflection and ‘slow science’ (Frith, 2020; Stengers, 2018) that a moratorium would provide could be used to consider working conditions and inequities in academia. Academics in many countries, including those with strong labour laws such as the Netherlands, report working conditions in which unpaid overwork of 35–45% is considered normal (AOB, 2020). This makes academia one of the professions most prone to burn-out (Jongepier & Van de Sande, 2021). The high workload especially undermines persons carrying heavier domestic responsibilities, and these continue to fall disproportionately to women and to persons who cannot afford paying for services to meet these responsibilities (Goulden et al., 2011). The drop in women’s scientific production during the pandemic made this chronic backdrop reality starkly visible (Myers et al., 2020).

There are important risks associated with calling for a blanket moratorium on climate science, however. If governments have by and large accepted scientists’ conclusions yet not acted, it is hard to imagine that a moratorium in the production of this science would spur them into action. From this perspective, a moratorium could be inconsequential, other than as a show of protest. Even more so, it could very well play into the hands of those actors who have worked so hard to cast doubt on climate science and that have engaged in denial and delay tactics. Depending on its duration, a moratorium can also be harmful for actors in government or civil society, including business, who are willing to act or are currently taking action. Scientific assessments can empower actors in different ways (Maas et al., 2021), including spur civil mobilization in favour of climate adaptation, mitigation and environmental justice. This is precisely why anti-environmental forces attack environmental knowledge. A case in point is the use of IPCC reports in the recent successful

court case brought by Friends of the Earth Netherlands against Royal Dutch Shell, in addition to countless adaptation and mitigation initiatives at local levels.

Evaluating current research priorities

One important blind-spot in Glavovic et al.’s call for a moratorium is that they refer to climate science as if it were a singular entity. Noting that science has demonstrated that the climate is changing, why it is changing and why it is getting worse, including the implications for human well-being and social-ecological systems, Glavovic et al. conclude that *the science* is settled. But that does not apply to social science, humanities and participatory research approaches bearing on environmental problems and the prevention of planetary emergencies. Understanding of complex societal, political and economic dynamics is very far from settled, and even less settled is how these might be effectively and wisely transformed to ensure just transformations. Research on these dimensions is vitally needed, and it has not received the needed support and prioritization to fulfil its potential. Thus, instead of stopping all research, our suggestion to transform environmental research entails a profound shift in research priorities towards these societal and political dimensions, and this also implies a relative deprioritization of currently dominant research agendas.

We make this suggestion not only in response to the presumed *lack* of effectiveness of environmental science to which Glavovic et al. point but also out of a growing concern with some of the emerging political implications of what it *has* done. Specifically, we draw attention to the limitations of current natural sciences-dominated research agendas which are oriented towards the diagnosis of conditions and trends in the planet’s biogeochemical properties and processes (Lahsen & Turnhout, 2021). While this knowledge has been, and remains, important to create awareness of the nature and extent of environmental problems, it has limited value to inform action. It is well known by now that predictions of environmental disasters are insufficient to prompt needed actions. Moreover, the use of global aggregates and technical terms such as ‘drivers’ draws attention away from the uneven distribution of responsibility for causing environmental degradation, thereby limiting options for accountability (Pascual et al., 2021). In some cases, environmental research also serves vested interests. Model projections of future negative emissions by means of carbon removal technologies have served climate negotiators wishing to delay actual reductions in emissions (Carton et al., 2020) and similar criticisms have been made about geo-engineering (Buck, 2012; Low & Boettcher, 2020). These strategies, projects and technologies variously do not exist yet, are not practically feasible, and/or have not been proven to be effective. At best, they constitute what Buck et al. (2020) have called ‘stopgap measures’ rather than long-term robust solutions. In view of these examples, we consider that science, by calculating the potential future climate benefits of these measures, and by allowing these calculations to be mobilized politically, has contributed to delays in actual decarbonization, or at least has helped justify such delays.

In light of this, it is ironic that the insistence on this dominant natural science and modelling-focused approach results from a desire to be politically neutral. This widely held belief in neutrality as not only an ideal in science but a real possibility and, even, actual reality, defies long-established insights (Harding, 1992; Mulkay, 1976) and has caused problematic biases and gaps in knowledge and understanding. It has resulted in a lack of attention to the political, economic and societal dimensions of both causes and solutions to environmental problems, and to considerations related to justice and equity. Research on power-laden ideational factors that explain why the emissions curve has not been bent after three decades of climate policy (Stoddard et al., 2021) has too little place in the vast majority of what passes as global environmental change science, including IPCC assessments. Participatory approaches to knowledge production that are inclusive of diverse actors and knowledge systems also remain underfunded and undervalued, despite growing international consensus that they are indispensable for the production of actionable and legitimate knowledge (IPBES, 2019). Social science, humanities and participatory approaches are indispensable for gaining a systematic understanding of the role of power, discourse, values and interests in perpetuating environmental destruction, and they are equally needed for designing effective and just interventions that catalyse change at diverse spheres of action at institutional, practical and (inter)personal levels (O'Brien, 2018).

Calls for adjusting research priorities in this direction have been issued with rising frequency and intensity since the 2000s (Hackmann et al., 2014; Sterman, 2008). These calls build on a large body of literature – in environmental social and political science, environmental humanities, including the interdisciplinary field of Science and Technology Studies and, also, in relevant natural science domains – that has critically examined challenges and opportunities of science–policy interfaces, including how academic research institutions themselves contribute to the forces that obstruct change. Yet, despite considerable apparent institutional recognition and support of adjustments in international research agendas to strengthen such needed research (Lahsen, 2016), and intelligent efforts to carry them out on the part of international institutions such as Future Earth and IPBES, progress in transforming environmental research has remained limited (Lahsen & Turnhout, 2021). Funding schemes in the environmental domain – including those that emphasize and profess interdisciplinarity – in practice often continue to prioritize the natural sciences. As a result, the allocation of resources is extremely uneven. A recent study surveying 37 countries estimated that the natural and technical sciences receive, on average, 770% more funding than the social sciences (Overland & Sovacool, 2020). While it is a global phenomenon, underfunding of environmental social science and humanities research is especially marked in the Global South (Overland & Sovacool, 2020.), which holds most of the world's people and biodiversity.

The fact that Glavovic et al. would make their call for a moratorium on climate science without discussing any of the above issues – indeed without apparent knowledge that there exists an extensive body of literature they could have drawn on for

this discussion – both reflects and reinforces the persistent marginalization of social science and humanities relative to the natural sciences that we argue is one of the obstacles to the very action that the authors wish to foster. Glavovic et al. do not recognize the consequences of this structural marginalization when they conclude that the social sciences also have not achieved much impact to date and, therefore, in the authors' judgment, also merit a moratorium.

Re-making the science–society contract

For Glavovic et al., the cause of the tragedy they identify lies squarely in the domain of society and policy decision making. They write:

This is the tragedy of climate change science: the compulsion to do ever more research on climate change when the science–society contract is broken. The tragedy is continuing research when the problem is political, diverting attention away from where the problem truly lies, and being gaslighted into crafting new scientific institutions, strategies, collaborations and methodologies (p. 2).

While we agree that politics are indeed important to the understanding of climate action and inaction, the statement also reveals that the authors locate the problem outside the domain of science. In their minds, the problem is that science is not being heeded. This suggestion that we merely need to 'listen to science' is misleading and reinforces a problematic depoliticized belief in the possibility of discreet and clear solutions that follow from objective and independent scientific diagnoses and projections in a straightforward manner (Eriksen et al., 2021; Evensen, 2019). However, as is clear from our arguments so far, *the research-side* of the equation is an inherent part of the problem and therefore also needs a thorough overhaul to achieve positive and just transformations towards sustainability.

This overhaul requires a fundamental rethinking of the science–society contract so that it recognizes the intimate interactions between science and society, as well as the impossibility of escaping politics. Glavovic et al. refer to the science–society contract as the unwritten expectation that 'public investment in science will lead to an improved understanding of our world and help achieve outcomes that are deemed beneficial to society' (p. 2). Underlying this contract is what has been referred to as the 'linear' and 'loading-dock' model of science–society relationships (Cash et al., 2006). This model assumes a separation between science and society and a unidirectional relationship that flows from independent scientific knowledge production to actors in policy and society and it functions as a dominant ideal to evaluate and organize science–society relations; the structures and procedures of IPCC and IPBES, for example, are largely premised on assumptions aligned with the linear model (Turnhout & Purvis, 2020).

However, it has long been established that this linear model does not resemble actual interactions and relationships between science and society. Empirical analyses of the science–policy interface suggest that, in practice, science and policy are inextricably interlinked and that interactions between science and society are structured by and take place

within common frames that define what the issue is, what its causes are, what solutions are possible, and what knowledge is relevant (Turnhout et al., 2019). Through these common frames, scientists are locked into a rather tight relationship with policy-makers and societal actors in which enrolled scientists feel compelled to produce reports that speak to the policy considerations that are derived from these frames. Importantly, this is not merely a matter of undue influence of politics over science or of science over politics; the role of framing makes clear that facts and values are inextricably entwined in scientific knowledge. As our discussion of science's facilitation of stopgap' measures and the marginalization of social sciences and humanities have also illustrated, politics resides not just in society but also in science; the production of knowledge is itself political in the sense that it is shaped by values and has political consequences (Turnhout, 2018). How science conceptualizes, measures and evaluates climate change and frames it as a problem is intimately connected to what policy options are considered and bears centrally on how the climate ends up being governed (Hulme, 2010).

With this, we have arrived at what we see as the core problematic in Glavovic et al.'s arguments: their a-political framing of science and of science–society relationships which locates politics outside of science. There is no doubt that relationships between science, policy and society need changing, but if there is anything 'broken' about the science–society contract, the solution is not simply 'bridging the science-policy interface' (p. 2). In fact, the use of technical terms like 'broken' and 'bridge' is yet another sign of depoliticized discourse in discussing science. There is a need to re-make the science–society contract by bringing politics into focus (also see Scoones, 2009). As part of this contract, researchers should commit themselves to ask explicitly political questions about what frames and interests their research supports, what knowledge and needs are excluded, and whether and how this can be justified. We recognize that this can be uncomfortable and difficult for many. But it is important to recognize that *not* doing this is equally a political choice. As we have seen, maintaining a presumed neutral position can easily result in the unquestioned acceptance and reinforcement of dominant frames and vested interests.

Transforming environmental research

A renewed science–society contract that recognizes the political dimensions of both decision making and knowledge production can effectuate the much-needed transformation of environmental research. Open and honest self-critique and power sharing can create opportunities and support for new and more diverse thinking and deliberation, resulting in the empowerment of researchers to shift their priorities to areas where research is most needed: (1) a deeper reflection on what knowledge is needed to support action; (2) the systematic understanding of obstacles to action, including, not least, the very politics that Glavovic et al. posit as the core problem and (3) the design of strategies to overcome these obstacles in ways that ensure not just sustainability in a narrow sense but also justice, equity and social-ecological well-being.

On the surface, calling for an adjustment of research priorities might seem less radical than a moratorium, but the implications of our proposal, and the resistance it will face, are not to be underestimated. The lack of progress despite repeated calls to transform environmental research leaves clear that the obstacles to transforming research are as persistent and structural as those in society to which Glavovic et al. point. The general misrecognition of the inextricably interrelated nature of science and politics, despite profusive peer-reviewed evidence and entire academic fields dedicated to analysing these interconnections, is testimony to the strong interests – in science, policy and society – in maintaining understandings of science as neutral and separate from politics. Moreover, a genuine transformation of environmental research will inevitably also require a relative reduction of research approaches that are less relevant to the needed action, affecting resources and status of those who have built their careers on these approaches. It is this mix of scientists' own interests and prevalent norms about what constitutes good science and how science can be useful that has kept in place a maladaptive persistent emphasis on the diagnosis of current and future biogeochemical realities (Lahsen & Turnhout, 2021).

With this article, we have joined Glavovic et al.'s call to stop doing more of the same science, but with an important modification. By underscoring not just a lack of effectiveness of current research agendas but also the detrimental political implications of continuing on the current path, and by offering a way forward, we hope to spark the needed impetus to transform cultural norms and agendas in environmental research and to strengthen its contributions to transformative change. This, we believe, is crucial to ensure not just the legitimacy of environmental research but also its credibility and authority.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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