

Integration of the Social Sciences in the Study of Earth System Interactions

Earth systems – both natural and social – are undergoing unprecedented change. The trajectories of these changes is the result of human actions. More specifically, a substantial driver of change are historically high levels of consumption, or rather, unequal consumption. Astonishing social, institutional, and technological innovations underpin the nature and levels of inequalities in ownership of wealth and capital and in consumption driving earth systems changes. For example, the 18th century social invention of the corporation has enabled concentration of wealth, information, and power that today dominate what is happening to - and in - earth systems. As legal entities in their own rights, modern day corporations asymmetrically control the everyday structures of socio-political life with a power and thoroughness that governments historically only could dream.

Institutional and political arrangements that underpin contemporary production, distribution and consumption consolidate the socioeconomic inequalities that are driving earth systems transformations. Two of the consequences of such consolidation – increasing political polarization and the rise of right-wing populist nationalism – are evident in the current experiences of everyday life. A stunningly high density of global connectivity and social media empires focus on sharing the anomalous. This also means that information about ruptures and disjunctures is available to anyone with a digital receptor almost instantaneously – both as example and as tactic.

Studying these earth system-shaping processes using an integrated scientific approach is a great start. If this approach does not also identify strategies for addressing inequalities and injustices, its findings will do little to change the trajectories along which contemporary earth systems are traveling.

Studying the asymmetric processes that lead to accelerating and unequal trajectories of change is complex enough. It is complex because our understanding of the concepts through which to study inequalities and injustices is murky and disputed.

It is complex because there is far more limited data about the objects of our knowledge – prevailing distributions of income, capital, wealth, resources, energy and the like – than there is for aggregate and average social and ecosystem outcomes. The flood of data and the rise of big data related to earth systems is far more about what is happening to socio-ecosystems, and it is far less about why it is happening or its relationship to inequality and injustice.

It is also complex because our theories of the drivers of these asymmetries are contingent and descriptive rather than explanatory and predictive.

Finally, this complexity means that our models of how to address inequalities as also our capacity to translate the necessary knowledge into action are at best incipient.

Yet, without deeper, more generalizable, more systematic knowledge and capacity to address injustice and inequalities, our ability to affect earth systems trajectories will remain highly constrained and hobbled. Focusing on the development of a technically skilled workforce that can handle the ever-increasing complexity of contemporary workplaces, the intricacy of service tasks, and the flood of data that connectivity and surveillance make feasible will do little to address the massively increasing footprint of humanity. Training a workforce that aspires to advance the maximization objectives of the corporations it serves without the ethical capacity to ask questions of the choices made by employers

makes it all too likely that such choices will adversely affect earth systems – surely that cannot be viewed as a contribution to the public good.

How to address inequality and injustices, and to do so in a way that has the promise of improved socioecological earth systems outcomes, is perhaps the greatest of challenges confronting efforts to integrate the social sciences into the study of earth systems interactions. And yet, as I think about this challenge, especially in the context of the intractable persistence of inequalities and injustices, it seems to me almost that the question or the nature of the task is defined too hastily. And some of the obvious shibboleths proposed as answers – increase participation, involve communities, decenter dominant narratives – are perhaps both hasty and inadequately elaborated.

Integrating the social sciences better into the study of earth systems to address inequalities and injustices is inadequate because such a reflexive solution does not consider the vast diversity that social sciences contain. It does not entertain the reality that many social scientists – like many ecological and natural scientists – are not particularly motivated to address practical problems – the task is not to act but to understand. And it does not recognize that in fact many areas of knowledge production are actively engaged with supporting the contemporary trajectories of change. What we need instead is to understand how better to integrate more critical sciences and voices into the study of earth systems and their changes. Voices that do not simply seek to understand, but also to change. Critique is critical for science to have direction.

At the same time, reflexive solutions that foreground community, marginality, or identity are insufficient for any meaningful and effective marriage of science and critique. If there is anything that the events of the last week bring home with particular force it is that those who see themselves as lacking a voice or are convinced of the importance and righteousness of their opposition to the status quo are not necessarily correct. Science and facts are necessary for critique to be grounded and well-founded.

This returns me to the four points I made earlier about the importance of concepts, data, theories and models of knowledge to action for undermining and reversing everyday trajectories of earth system change.

Far too often, we conflate appropriately distinct concepts related to inequality and injustice. We need to distinguish between goals (inclusion, equity, redress), mechanisms (recognition, procedure, allocation), and principles (merit, contribution, rights, need) of justice to systematically and effectively identify the actions that may lead to change. That the interpretation of these concepts and their dimensions is context dependent highlights the importance of support for development and familiarization of an empirically testable set of propositions about equality and justice in the context of earth systems change.

The flood of data notwithstanding, there is far too little information to allow researchers to understand how ongoing earth systems changes conform to or undermine possibilities of inclusion, equity, and redress. Support for development of usable datasets allow characterization of changes in inclusion equality and justice at multiple levels of socio-environmental aggregation is critical for scientifically informed actions.

Better data is only a step – and likely not the most important step – towards the evolution of situationally grounded knowledge about the relationship between inequality and earth systems

changes. We need to strike a balance between approaches that center causes of effects vs those that focus on effects of causes when it comes to the integration of critical sciences into the study of earth systems. We need to escape the tyranny of both causal inference and the recourse to machine learning oriented algorithms of pattern detection.

Finally, and perhaps most importantly, it is critical to support the development of better models for the translation of knowledge into action. Simplistic notions of nudges, participation, repetition of information to produce truth, or self-making have failed us. We need far more carefully elaborated knowledge-to-action models that also characterize when particular mechanisms work, or work better.

In conclusion, I want to reemphasize the three themes around which I have structured my comments. (1) The critical importance of attending to issues of justice and equity in integrating critical sciences into the study of earth systems. (2) the importance of critique for science and of science for grounding critique. And (3) moving beyond obvious approaches of focusing on the social sciences, or marginalized groups and instead to foreground conceptual development, data for conceptual elaboration and theory testing, and better models of knowledge to action.