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Science advice for global challenges: Learning from trade-offs in the IPCC

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ABSTRACT

In the context of ongoing debates about the place of knowledge and expertise in the governance of global challenges, this article seeks to promote cross-sectoral learning about the politics and pitfalls of global science advice. It begins with the intertwined histories of the Intergovernmental Panel on Climate Change (IPCC) and the global climate policy regime, before examining the politics of different 'framings' of the climate problem and the challenges of building and communicating scientific consensus. We then identify three important trade-offs which the IPCC has had to negotiate: global versus local; scientific disinterestedness versus policy-relevance; and consensus versus plurality. These lessons are especially timely as global institutions begin to convene knowledge to address urgent sustainable development challenges posed by anti-microbial resistance (AMR). While the IPCC experience does not provide a wholly transportable model for science advice, we show why similar trade-offs need to be addressed at an early stage by architects of advisory systems for AMR as well as other global challenges.

1. Introduction

The need for integrating different sources of knowledge is a major theme in contemporary debates on environmental policy. Given the prominence of biophysical sciences in characterizing environmental problems, the job of knowledge integration is often associated with institutions at the science/policy interface tasked with providing science advice (Wesselink et al., 2013). Modelled on national science advisory bodies, such institutions are meant to fulfil the role of assessing the state of research on a given issue and synthesizing relevant evidence for policymaking. However, there is growing recognition of the need to open up these institutional arrangements to scrutiny so as to understand how different inputs are integrated in practice (Borie and Hulme, 2015; Scoones, 2009) and to consider ways of bridging scientific inputs with those from other disciplines and from stakeholders. The case for 'opening up' is set out in work calling for inter/trans-disciplinary research (Miller et al., 2014) and a broader notion of environmental expertise (Sörlin, 2013) befitting the complexity of environmental challenges.

In this paper, we identify lessons for global environmental science advice from the history of the most influential institution in this domain, the Intergovernmental Panel on Climate Change (IPCC). The IPCC has pioneered new ways of assessing scientific knowledge across a broad range of disciplines and interconnected topics, helping to cement climate change within international policy agendas. A number of scholars have written about the challenges of the IPCC 'model', for example, in: adequately representing marginal peoples, places and knowledges (Bjurstrom and Polk, 2011; Ford et al., 2016); delivering authoritative and usable knowledge to policy-makers (Haas and Stevens, 2011; Mitchell et al., 2006); and generating trust across diverse social groups and political cultures (Beck, 2011; Jasanoff, 2011). The IPCC's apparent success in at least partially overcoming these challenges prompted the establishment of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in 2012 (Beck et al., 2014; Montana, 2017) and calls for similar bodies to provide advice for other global challenges such as antimicrobial resistance (Woolhouse and Farrar, 2014), which is rapidly emerging as a major issue at the environment/health interface (Antimicrobials in agriculture and the environment: reducing unnecessary use and waste, 2015).

Observers from other grand policy challenges may envy the IPCC's undoubted symbolic power (Hughes, 2015). Yet attempting to transfer this model of knowledge production to other issues is problematic without detailed analysis of the IPCC's role in both climate science and politics and how this might inform science advice in other cases. There is therefore an urgent need for scholars of the science-policy interface to work across different domains. This paper helps fulfil this need, joining emerging work generating comparative perspectives and lessons (Beck et al., 2014; Esguerra et al., 2017; Jabbour and Flachsland, 2017;

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Kowarsch and Jabbour, 2017).

The paper begins with the emergence of the IPCC and the global climate regime (Section 2), an analysis of the framing of the climate problem (3), and the conceptualisation of science advice as consensual (4). From these, we identify three trade-offs that require attention when developing advice: ***'global vs local', 'scientific disinterestedness vs policy relevance'*** and ***'consensus vs plurality'*** (5). We then examine the implications of these trade-offs for a contemporary example, antimicrobial resistance (AMR) (6) before returning to the wider implications for science advice. Our focus on AMR is timely as it is now acknowledged as an urgent challenge for sustainable development and efforts to synthesise scientific evidence for global policy recommendations are emerging (WHO, 2017). We combine key findings from many years of published qualitative research on climate science and the IPCC, with original social research on how AMR is being understood as an environmental phenomenon.

2. Emergence of the IPCC and the global climate regime

The IPCC is widely regarded as a successful example of global science advice. Its voluminous assessment reports are produced by thousands of volunteer scientists working across three Working Groups dealing with physical science (WGI), social and ecological impacts and adaptation (WGII), and mitigation options (WGIII). Both report outlines and final content are approved by government representatives, and are intended to form the scientific basis for governmental policy-making.

The IPCC was formed in 1988 under the World Meteorological Organisation (WMO) and the United Nations Environment Program (UNEP). Strong consensus statements emerged from scientific conferences on climate change in the mid-1980s, but it was perceived by many that the political complexity of climate change was such that more was needed to drive political action. In light of dissatisfaction with the Advisory Group on Greenhouse Gases, a small, underfunded advisory group set up in 1986 by WMO, UNEP and the International Council of Scientific Unions which was arguably too distant from the policy process to be effective, calls were made for a more comprehensive international assessment effort (Agrawala, 1998). Following complex negotiations between WMO and the US Government, the road was paved for the creation of the IPCC.

The IPCC's emergence coincided with, and reinforced, a reconceptualization of 'climate' as a complex, *global* system. This followed decades of scientific work on general atmospheric circulation, on the data and modelling infrastructures required to study it (Edwards, 2010), and the emergence of new ideas about the management of environmental problems through global cooperation (Miller, 2004). It was the novelty of the latter which arguably drove the desire for an *intergovernmental* institution, with various competing actors, not least across different US Government departments, keen to ensure governmental oversight of such consequential knowledge-making (Agrawala, 1998).

The initial focus was to provide a comprehensive assessment of climate change and its potential impacts, while debating the relative merits of possible responses. A number of developing countries expressed unease at this positioning of the IPCC across the science-policy interface, fearing that the Western dominance of climate science would enable them to dictate the terms of global climate policy. In 1990 the Intergovernmental Negotiating Committee was formed as a separate setting for drafting what would become the UN Framework Convention on Climate Change (UNFCCC). Post-1990, the IPCC reverted more to scientific assessment, promising policy neutrality across its three Working Groups. IPCC Assessment Reports consist of each Working Group's own report, plus a succinct, collaborative Synthesis Report. Five Assessment Reports have been completed between 1990 and 2014, with preparations for a sixth beginning in 2015. These assessments inform parties to the UNFCCC and underpin UN negotiations.

The IPCC's core task is to assess all the available science and issue consensus statements about the present and future states of anthropogenic climate change. The IPCC has also addressed direct policy questions, such as the potential meanings of 'dangerous' climate change and has provided focused assessments of topical questions like extreme weather (IPCC, 2012), renewable energy (IPCC, 2011) and the impacts of 1.5 °C of warming in Special Reports (IPCC, 2016).

3. Framing the climate problem

The most widely discussed findings of the five Assessment Reports have concerned global mean temperature rises to date and in future, and scientists' ability to attribute these rises to human activities. This may seem normal now, but it wasn't to many in the 1980s. Russill (2016) has argued that this period saw a struggle to 'frame' climate change as either a question of global trend detection and management, or as a question of local climate-society interactions and bottom-up risk management. Trend detection won out, due in part to the new dominance of global models, but also, Russill suggests, to contemporary US energy politics where the management of global trends was a dominant mode of thought across science and politics. Similar preoccupations with the global also emerged in other domains including that of 'emerging infectious diseases' which paved the way for conceptualizing health policies in terms of security (King 2002). However, in the IPCC's evolution over the next two decades, we can trace a shift in framings from climate change as a problem of additional carbon dioxide and temperature, to a problem of risk management, albeit at an increasingly global scale. In recent WGII reports in particular, some of the concerns of the dissenting 1980s scientists, who lobbied for risk management rather than trend detection/management approaches, are starting to be addressed, through approaches which marry top-down framings of vulnerability with bottom-up, contextualised understandings of climate-society relationships (O'Neill et al., 2017).

Implicit in any framing of climate change as a problem of global trend management is the assumption that climate change is a well-structured technical problem, within which scientific advice could act as a trigger for international policy agreement (Hoppe et al., 2013). However, many social scientists have argued that climate change is actually an unstructured, or 'wicked' problem at the global level, spanning both social and climate systems and containing deep cultural and political differences over values, goals and meanings (Demeritt, 2001; Hoppe et al., 2013). Framing climate change as a global problem with global solutions has been a natural progression of trends in both science and politics, but the result has been a heavily centralised supply of scientific advice that neglects the need for geographically differentiated and plural policy approaches (Hoppe et al., 2013).

Problem framings have powerful effects on how solutions are conceptualised. Some have worried that the IPCC's emphasis on global trend detection has pushed adaptation to the end of a chain of accumulating impacts where it functions as the social cost of failed mitigation (Beck, 2010; Hulme, 2011). Some have argued for more concerted thinking about adaptation to already evident climatic extremes, and less about determining their direct cause (Hulme et al., 2011). Certain framings may also play better in different political cultures. For example, trend and/or risk management may appeal in North America, where the burden of proof is often placed on proponents of environmental regulation, but may not sit so well with more precautionary attitudes in Europe (Jasanoff, 2005; Mahony, 2015). In the global South, the IPCC has also faced controversy in the way it has framed Southern forests as 'empty' spaces available to suck up the global North's carbon pollution (Fogel, 2005), and in its valuing of Southern lives at lower levels than Northern lives (Masood, 1995). This shows that in controversial issues like climate change, scientific claims may not be simply 'neutral'. Rather, they shape the contours of how we think – politically, ethically, culturally – about responding to the issue at hand. Institutions like the IPCC exert great political and symbolic power (Hughes, 2015), and therefore face dilemmas about how to frame scientific issues in ways which are credible, legitimate and salient