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Advanced scholarship

Interdisciplinary research at the science–policy interface

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Introduction

How can we better organize and publish meaningful research to help us better understand and respond to the global environment problems we face? This chapter provides suggestions for successful interdisciplinary research on international environmental politics, based on a review of published and unpublished works in the field. Usable science and knowledge is essential for devising effective environmental policies to address major global environmental threats, including climate change (see Chapter 28). Most policy analysts believe that better public discourse and elite deliberations require reliable knowledge that is accurate and socially legitimate (Haas 2004; Mitchell et al. 2006). Accurate knowledge in the environmental domain must be interdisciplinary in order to capture the complex array of interactions between social and physical activities that give rise to global environmental threats. Legitimate knowledge must enjoy a social pedigree, which in practice is often the peer-review process. For example, the Intergovernmental Panel on Climate Change (IPCC) requires that all information that it presents be published or accepted in peer-reviewed journals and books. While this requirement leads to a lag in the dissemination of scientific knowledge to policy making, it does enforce the legitimacy of the knowledge that is being presented. Consequently, despite efforts by "climate denialists" to delegitimize climate change science over the last several years in the United States and the United Kingdom, the integrity of the climate change science was ultimately upheld by the courts and high-level oversight panels in each country.

Many scientists are frustrated that their work is not readily recognized in the policy community(Hulme 2009; Schneider 2009; Bradley 2011). One recent approach to science communication focuses on the rhetorical presentation of science and the psychological factors that influence its reception (Boykoff and Boykoff 2004; Leiserowitz et al. 2006; Boykoff 2011). Others look at the political constraints operating on governments that impede the reception of new information which may require costly new measures (Hulme 2009), or from entrenched domestic interests in the United States (Oreskes 2007; Schneider 2009; Oreskes and Conway 2010; Bradley 2011). In this chapter we focus on the instrumental means by which usable knowledge is generated and circulated (see also Chapter 17). Elsewhere Haas has argued that credible science is provided by epistemic communities (Haas 2001, ~~2004, 2004,~~ 2007). Here we

focus on the published medium by which epistemic communities may better make their voices heard in the public discourse. We draw largely on experiences from published and unpublished manuscripts from the MIT Press series on Science, Politics and the Environment, which has published 18 edited and multiauthored interdisciplinary volumes on climate change.

The need for interdisciplinary knowledge about global environmental threats

Although the causes and effects of global environmental problems tend to be multidisciplinary and interdisciplinary, modern scholars too often are disciplinary. The complexity of environmental issues – in terms of the number of and interactions among variables, the length of causal chains, and the extent of interactions across time, space, and scale – requires insights from multiple disciplines to capture accurately the extensive and multiple understandings of their causes, causal mechanisms, and effects (Price 1992; Jacobson and Price 1990; Wiman 1991; Consortium for International Earth Science Information Network (CIESIN) 1992; National Research Council 1999a; Brewer and Stern 2005; Biermann 2007). Despite this, most scholars are trained – and often continue to think – in ways that are strongly disciplinary. As Gary Brewer cleverly quipped, "the world has problems, but universities have departments" (Snow 1962; Brewer 1999: 328). Addressing this disconnect between the problems we face and the solutions we offer is akin to reconciling different "epistemic cultures," i.e., the habits and beliefs associated with different academic disciplines (Knorr-Cetina 1999). Given this, how can we better organize and publish meaningful research to help us better understand and respond to the global environmental problems we face? (See also Chapter 5.)

Since environmental problems emerged on the scholarly agenda in the 1970s, academics have debated the proper way to analyze their causes and effects. Alvin Weinberg, in 1972, called for "transdisciplinary" work that went beyond single discipline studies of environmental issues (Weinberg 1972). Others promoted the virtues of multidisciplinary work that drew on various disciplines. Tribe and colleagues noted that variation in analyses of a given environmental problem was likely to reflect, in large measure, the disciplinary values and perspectives of the analysts rather than real variation in the problem unless an interdisciplinary approach was used to help those from different disciplines converge on common values and methods (Tribe et al. 1976). Integrated assessment modelers, particularly in Europe in the 1990s, frustrated by their lack of influence on policy-makers, argued for interdisciplinary work that included policy-makers and stakeholders at the outset. Indeed, some have argued that environmental complexity exceeds the limits of traditional policy analysis and can only be meaningfully addressed through dialogues among such diverse groups (Ravetz 1986; Funtowicz and Ravetz 1991, 2001; Kasemir et al. 2003).

Training environmental scholars

Views about the proper training of environmental scholars have changed significantly over time, with corresponding changes in terminology from "generalists" to "multidisciplinary," "interdisciplinary," "transdisciplinary," and "sustainability" scientists. During the 1960s and 1970s, people sought to help graduate students become *generalists* by training them in several aspects of the multiple fields needed to meaningfully contribute to our understanding of a problem. This approach ran into two problems. First, were institutional incentives: universities lacked tenure track jobs for such individuals, either failing to hire them or placing them in programs (rather than departments) in which they trained few if any graduate students who could reproduce, develop, and refine their ideas. Second, were individual capacities: as the number, magnitude, and technical

nature of environmental problems grew over time, it soon became clear that few individuals could master the array of tools and scope of knowledge to conduct environmental research.

By the 1980s, *multidisciplinary* had become the professional mantra, largely in response to the institutional incentive and individual capacity problems ~~mention~~ above. This approach saw the answer as building teams of scholars from diverse *social science* disciplines who individually could receive tenure and promotions within existing university structures but who collectively could shed better light on the complex environmental problems in question (Keohane and Ostrom 1995; Young 1997, 1999; Miles et al. 2002; Young et al. 2008). It was hoped that teams composed of individuals well versed in their own disciplines but interested in working with those from other disciplines could generate better insights by creating analytic synergies and identifying and removing disciplinary blind spots.

During the 1990s, this multidisciplinary perspective transitioned into an *interdisciplinary* one that sought to bridge the disciplinarian chasm that traditionally divides the social sciences from the natural sciences and engineering (Social Learning Group 2001a, 2001b; Miller and Edwards 2001; Schellnhuber et al. 2003; Jasanoff and Martello 2004) This shift urged greater collaboration across this chasm in an effort to progressively remedy the problem that social scientists often got the natural science wrong and natural scientists and engineers often got the social science wrong, with either error posing the risk that the science would be wrong and/or irrelevant to policymakers.

Throughout this period and into the 2000s, policymakers demonstrated an increasing desire for "usable" science that was not only ecologically sound but was also politically, economically, and sociologically informed while scholars demonstrated an increasing desire to contribute to policy debates and a frustration that their work so rarely did ~~so~~. Both as a reflection of, and contributor to, these trends, increasing attention was paid to those who were calling for *transdisciplinary* work. Such work sought to generate new theoretical frameworks for understanding social–ecological relationships rather than, as earlier work was accused of doing, simply trying to better understand the causes and effects of particular social–ecological problems (Jasanoff 2003, 2004; Kasemir et al. 2003; Brewer and Stern 2005). Such an approach aspires to forging a new theoretical framework for understanding environmental complexity that is drawn from a hands-on dialogue between practitioners, civil society advocates, and ~~active~~ scientists across the full spectrum of natural and social sciences and humanities. It also cautions against the hubris of a physics-based nomothetic approach to knowledge cumulation, ~~rather~~ focusing on deeper understandings of specific important problems through participatory learning.

Some recent scholars have called for interdisciplinary, international research teams that encompass not only academic researchers but also policymakers under an umbrella of Sustainability Science (Gallopin 2006; Kates et al. 2001; see Chapter 15). In this view, for interdisciplinary research to be successful, it must involve individuals from a range of disciplines, each of whom is well trained in their own discipline; has some familiarity with the core concepts of other relevant disciplines; and is skilled in making the core concepts of their discipline accessible to other scholars, policy-makers, and stakeholders. Assembling teams of such scholars is thought to promote progressive research that generates new knowledge and new frameworks of understanding that could not, or would be unlikely to, emerge from a single discipline's perspective.

The US National Academy of Sciences, in a series of reports initiated in the early 1990s, proposed a division of labor for socio-ecological research. In the National Academy's rubric, the social sciences can help explain the causes (or driving forces) of human behaviors that lead to global environmental change. The social sciences can also help explain the process by which societies and decision-makers respond to identified threats and thus help better understand the likelihood, means, and conditions that foster or inhibit alternative collective responses. The

natural sciences can help explain how problems unfold and identify goals for sustainable responses. In turn, different disciplines can contribute in ways that relate to their core concepts: power and institutions from political science, markets and price signals from economics, public opinion and social attitudes from sociology and political science, local knowledge and organization from anthropology, issues of law and enforcement from legal scholars, and the like. Similarly distinct fields of natural science can contribute insights into the behavior of different types of ecosystems (Rayner and Malone 1998; National Research Council 1999b; Biermann 2007).

Such calls for interdisciplinarity, of whatever sort, complement rather than replace more traditional disciplinary efforts. A full understanding of socio-ecological systems will always require the deep disciplinary research that stays within more traditional disciplinary boundaries. For instance, in political science, *Institutions for the Earth* (Haas et al. 1993), a team-based project undertaken by political scientists, looked at the question of how international institutional design can improve the management of shared ecosystems, as well as some international public goods (see Chapters 8 and 9). It found that institutions that enhance cooperation, concern, and capacity were more likely to yield beneficial results than those without. Other groups of political scientists have confirmed that regimes with organized scientific involvement (epistemic communities) yield more comprehensive regulatory commitments and also better environmental outcomes than those without (Andresen et al. 2000; Miles et al. 2002; Haas 2007; Biermann and Pattberg 2012; see Chapter 17).

Conducting effective environmental policy research

How can effective research on global environmental issues be conducted? A key conclusion from this review of the philosophy of science for socio-ecological research suggests at the very least that meaningful work is best performed by teams of scholars. Several recent books have ~~also~~ tried to develop some heuristics for effective environmental policy research (Benda et al. 2002; Bergmann et al. 2005). Our judgments are based on our experiences as authors, as participants in interdisciplinary research projects, as editors of journals and book series, and as peer reviewers for journals, publishers, and foundations.

For present purposes, we consider research as effective when it provides new insights into the causes or consequences of global environmental problems in ways that foster, in the short or long term, human society's ability to mitigate or adapt to those problems. Achievements in this realm can be observed (if not measured) by reference to the degree that research:

- is published in peer-reviewed journals or with university presses,
- trains new scholars,
- leads policy-makers and stakeholders to accept new understandings of a problem and respond in more effective ways to mitigate or adapt to those problems.

The results of most past collective research projects in the global environmental politics arena, usually published as edited volumes, have tended to involve multiple chapters written by different, often multiple, scholars from various disciplines and countries. Such volumes often include authors at different career stages, from graduate students to senior professors. Building on our distinctions above, we distinguish two classes of research: interdisciplinary projects involving scholars from distinctly different disciplines including both social and natural scientists; and multidisciplinary projects involving scholars from a single discipline or a narrow range of cognate disciplines within the social (or natural sciences), such as political science, sociology, law, and economics (Choucri 1993; Winter 2006).

To date, most published work has been multidisciplinary. Interdisciplinary work is more difficult to achieve, as discussed below, because of the difficulties in spanning disciplinary cultures and vocabularies. In general, while these efforts highlight insights from individual disciplines about a problem they fail more generally to integrate them into a more coherent picture or even clearly to articulate the compatibility or tensions between different approaches (Cebon et al. 1998; Social Learning Group 2001a, 2001b). In short, truly interdisciplinary work remains in its infancy with considerable room for improvement. To foster progress in that venture, the following section reflects our thoughts for improving, and publishing, both multidisciplinary and interdisciplinary work on global environmental problems. While successful multidisciplinary and interdisciplinary work may generate new integrated wisdom, it may also reveal uncertainties and fundamental differences in understanding between actors and disciplines.

Applications of interdisciplinarity

Here we provide two exemplars of interdisciplinary books whose findings exceed the conventional views of single disciplines. *Changing the Atmosphere* (Miller and Edwards 2001) has ten chapters written by nine authors, ranging from PhD candidates to full professors. The authors come from information sciences, philosophy, social studies of science, biology and climate science. The research was well supported by a variety of grants. This collection was one of the earlier ~~social science~~ investigations of the production and use of climate science for policy. Thus it had a comprehensive introduction providing an overview of the critical social studies of science literature, but lacked a concluding chapter. The empirical chapters demonstrate the greater role of interpretation and uncertainty associated with scientific advice and the IPCC than was generally recognized by hard scientists and policy analysts (see Chapters 17 and 18). It developed the finding that science and science policy does not directly mirror the natural world, but rather that it interprets the world for policy and political consumers in ways that are socially and politically shaped. Thus the effective provision of scientific information requires political and social inquiry about the frames and context with which policy-makers solicit and understand scientific advice. Policy studies need to better understand the degree of distortion involved in the knowledge being delivered, and to focus on the political processes by which choices about knowledge claims are made and the knowledge is itself interpreted by less technically trained policy-makers.

More recently, *Reflexive Governance for Global Public Goods* (Brousseau et al. 2012) provides an interdisciplinary investigation of global public goods; an analytic category that includes climate change. *Reflexive Governance* has 15 chapters as well as an introduction and conclusion, written by 21 international contributors, drawn from research fellows, assistant professors to full professors, and one government official. Substantively, they range from economics, ecological economics, philosophy, politics, and interdisciplinary training in environment change. The interdisciplinary approach to global public goods complements conventional studies of international public goods that seek to internalize the costs of environmental degradation through hierarchical controls, market arrangements to internalize costs, or institutional arrangements to concentrate the environmental consequences. By studying a number of public goods occurring at different scales and with different participants, the authors find that the provision of organized scientific knowledge is capable of educating political actors to change their behavior and take account of environmental externalities which remain economically low cost. In this regard the volume is "reflexive" in documenting knowledge about how knowledge may be usefully integrated by national-level decision-makers to learn about climate change, and to embark on new policies that are more sustainable. Such collective reflection requires democratic participation,

scientific information, and a lengthy social process of deliberation (Dedeurwaerdere et al. 2012: 316–17; see Chapter 26).

Improving interdisciplinary and multidisciplinary research

In our view, conducting and publishing effective research requires that the scholars design the research in ways that meet ~~the three~~ criteria ~~delineated~~.

Selecting participants

The first step in developing successful interdisciplinary research is the selection of the research team. Individuals should be chosen on the basis of their depth of disciplinary expertise and their ability to communicate clearly about their discipline with those from other disciplines. Individuals also should be chosen to create an "expert team" rather than a "team of experts." An expert team consists of a set of scholars who have individual skills but also, collectively, represent the range of disciplines necessary to accurately evaluate and analyze the environmental problem in question and who also have the interpersonal skills that help a team run well. These include the ability and willingness to provide honest yet constructive feedback to others, to listen and respond quickly and well to such feedback from others, and to contribute to the project's overall goals, especially when that means altering individual research approaches and processes to foster those goals.

In addition, several benefits arise from having multiple ranks represented within a team. Junior scholars benefit from the explicit and implicit training and mentoring from more senior scholars with more extensive and varied experience who can demonstrate various solutions to the inevitable problems that arise in collective research. Senior scholars benefit from the intense exposure to and interaction with those trained in the most current research and methodological developments and by being challenged to respond to, rather than merely read about, alternative perspectives on various issues. Such interactions may help overcome the theoretical myopia that can develop in senior researchers who have worked within their own traditionally defined boundaries for most of their careers (see Chapters 3 and 4).

There are several obstacles to building such a team. One is that most networks of scholars are built within rather than across disciplines. Most scholars' networks include those who went to graduate school together and those who meet by going to the annual conventions of their own discipline. Institutional incentives reinforce the need to write papers that will be published in one's own discipline's journals and to "build a reputation" in that discipline and discourage the time "wasted" going to conferences, engaging in collaborations, and networking with those from other disciplines. The challenge is to identify and recruit people who either have found ways to achieve traditional measures of disciplinary success while retaining both the time and inclination to engage in interdisciplinary work or have found less traditional research trajectories in places such as the Santa Fe Institute.

We believe that policy-makers and stakeholders can make significant contributions to interdisciplinary research teams. One useful model involves having policy-makers and stakeholders involved in initial research project meetings to ensure that the research questions are framed in ways that promote salient research results that stand some chance of contributing to upcoming policy decisions in ways that are sensitive to existing political, financial, and social constraints and perspectives (Mitchell et al. 2006). Briefing these policy-makers and stakeholders at regular intervals during the research process also allows for "course corrections" that can improve the "uptake" of the ultimate conclusions without making them susceptible to the influence of these

groups. An obstacle that may need to be overcome exists in the relatively brief job tenure and demanding time schedule of individual policy-makers and civil society members. Thus involving individuals in such an enterprise runs the risk of discontinuities as members drop off and replacements bring in new agendas. Having briefing sessions with a broader community at the beginning and end of the research process, rather than relying directly on a cadre of individuals, offers an alternative solution.

Finally, we believe there is a "Goldilocks" problem in terms of team size. Interdisciplinary teams, to be successful, must contain sufficient expertise to address the array of perspectives and disciplines that can contribute to analyzing the problem in truly interdisciplinary ways. At the same time, teams that exceed 10 to 15 individuals can present a range of cost and logistical problems that can prove challenging for the organizers and can undermine team members' sense that their contributions are crucial to the team goals.

Building a team

Once participants have been selected, the next step in effective interdisciplinary research is building a team. Perhaps most important to doing so is the need to develop effective communication among team members, taking time to understand both the terminology and perspectives of the other scholars involved. Different disciplines can use the same word or phrase to mean completely different things and, at times, can use different words or phrases to mean the same thing (consider the difference in what a "climate regime" means to an atmospheric scientist and a political scientist). Equally important, but often harder to get at, are the more subterranean assumptions, methodologies, and "ways of thinking" that are deeply embedded in each discipline. Without intending to stereotype, economists may be more comfortable monetizing certain human values; physicists may see the world in more mechanistic terms; anthropologists may be less comfortable generalizing across different cultures, etc. Mutual understanding of and, equally important, respect for, these "cultural differences" requires an ongoing process that tends to require considerable in-person interaction and may take a year or more. Open and explicit discussions of disciplinary semantics and methodologies can help identify often broad and deep divergences in outlooks and approaches. Such efforts are crucial to development of a common but integrated understanding of ~~the~~ environmental problem that ~~the~~ scholars seek to understand.

The success of "team-building" also requires explicitly and directly addressing the task of designing an internally consistent framework that accurately and usefully integrates the different disciplines and perspectives of the scholars involved. When such efforts are undertaken and succeed, truly interdisciplinary work can emerge that creates synergies from the contributing scholars. When such efforts fail, edited volumes whose chapters nominally address the same problem may prove quite non-cumulative, with insights from many chapters being ignored, misunderstood, or not taken advantage of with the result that meaningful communication across disciplines fails to emerge.

Overcoming these problems often benefits from strong editorial leadership that develops support for, and if necessary imposes, a common framework for analyzing the problem, either with all contributing scholars applying the same framework or each scholar accurately using their own disciplinary tools to contribute to the overall framework. Procedurally, this often requires frequent face-to-face meetings throughout the course of the research project – and often more meetings than seem necessary – to develop a coherent common framework, to ensure collective understanding of that framework, to foster consistent application of that framework within individual chapters, and to develop careful cross-chapter insights as the project moves toward conclusion.

Developing coherent and collective findings

To ensure a project generates strong interdisciplinary insights and presents them in a coherent manuscript requires iterative interactions among those contributors analyzing the individual cases and the editors developing the collective conclusions. Reinforcing the need for "strong leadership" noted above, the need for a strong leader or team of leaders becomes particularly important as a project moves to completion. These individuals must, from the outset, clarify both the standards and deadlines they will use for including or excluding chapters in any final published manuscript. Projects are too often delayed by one or two scholars who deliver their manuscripts late or provide manuscripts of demonstrably lower quality than others planned for inclusion. Although telling a team member that their contribution will not be included is unlikely to be pleasant for either party, they are easier when the criteria for such a decision have been delineated and understood at the outset. Letting a project be held hostage by those who miss deadlines or fall short of the group's agreed-upon standards does a disservice to all the other team members. In case honoraria are involved, payments should be staggered to ensure successful iterated editing of drafts.

Beyond these logistical points, the editors of collective volumes owe an obligation to their contributors to engage in the careful cross-case comparisons that are necessary to identifying common patterns and themes and to deriving both ~~backward-looking conclusions and forward-looking conjectures~~. Editors should plan on blocking out the requisite three to six months of time needed to carefully read the contributed analyses, identify and write up interesting patterns, analyze the comparisons carefully, have their findings reviewed by ~~all~~ contributing authors, and revise the conclusions and introduction so that they simultaneously meet the goals of abstracting from the individual cases ~~without~~ doing ~~injustices~~ to the empirical evidence from those cases.

Training scholars

Beyond their intellectual benefits, interdisciplinary research projects that contain both senior and junior scholars provide excellent opportunities for mentoring. In-person interactions as well as those by phone or email, provide excellent opportunities for senior scholars to advise junior scholars on "threading the needle" of conducting research that is publishable in disciplinary journals and fosters professional advancement, that contributes to interdisciplinary understanding of important environmental problems, and that helps stakeholders and policy-makers improve human responses to the environmental problems being studied. Equally important, relationships that develop over the two- to ten-year timelines common to such projects provide the basis for respected senior scholars to write compelling letters of recommendation for interdisciplinary junior scholars seeking jobs or promotion in a world that remains, unfortunately, highly disciplinary.

These training and mentoring benefits can be fostered, especially for junior scholars, by developing a common team identity. This can be promoted by having a central institutional home for the research team, with a critical mass of PhD candidates, post-docs, and faculty that can interact regularly over the course of two or three years. Where such intensive interactions are not possible, ensuring that dedicated research team meetings are combined with more ad hoc meetings involving those team members that happen to be at annual conventions, particularly when team findings are presented at those meetings, can help considerably. Annual "retreats" at relatively isolated locations can also improve team esprit de corps and promote possibilities for following up themes more carefully than can occur in briefer more structured settings and can also facilitate more serendipitous interactions with benefits in terms of concept formation, analytic insights, and development of future collaborations.

Crossing the academic–policy divide

A crucial aspiration of many scholars involved in studying socio-ecological systems is to have their scholarship contribute to the mitigation and resolution of specific environmental problems and, more generally, to the improvement of the relationship humans have with the natural world. Yet understanding the conditions under which and processes by which good scholarship becomes usable and used knowledge remains a poorly understood element of socio-ecological work (Mitchell et al. 2006). Indeed, the current popularity of Sustainability Science reflects, at least in part, an effort to improve the ways socio-ecological scholarship is produced and presented to make it more usable and thereby overcome existing political disinterest and resistance that fail to lead to usable knowledge actually being used.

In the short term and at an initial level, scholars can increase the contribution they make to policy by self-consciously attempting to understand, and conduct their research in ways that reflect and respond to, the political and policy opportunities and constraints that often are the cause of scholarly irrelevance. Research often fails to be "salient," in the sense of being relevant to current policy decisions – it comes in before the policy recommendations being offered have any chance of success or after the policy "window of opportunity" has closed (Kingdon 2003; Mitchell et al. 2006). Equally important, scholars often confuse what "should be" the constraints and opportunities with what are those constraints and opportunities. In this vein of "small changes," it certainly also makes sense for scholars to carefully develop "summaries for policy-makers," to provide policy briefings to those working on the issue, and to entertain the wide range of other opportunities to communicate with and provide inputs to policy-makers and decision-makers. Dual conclusions, aimed at academic researchers and policy-makers, also seems like an imaginative technique (Miles et al. 2002).

Conclusion

The ability for scholars to have a larger and more long-lasting influence with policy-makers and stakeholders requires a deeper change in how research is conducted. Notions of "co-production" of knowledge and of "adaptive management" involve ongoing interactions among scholars (both natural and social scientists), policy-makers, stakeholders, and resource managers (Jasanoff 2004). In this model, the sequestered generation of knowledge by scholars that is published and handed off to policy-makers and others in policy briefings is replaced by efforts to build social institutions that involve relatively frequent interactions over several years in which trust and understanding can develop in ways that are designed to avoid political pressures influencing scientific findings while, at the same time, ensuring that political constraints are recognized as creating important boundaries within which policy recommendations must fall (even if, over the longer term, those boundaries themselves may be subject to change). Such co-production institutions allow policy-makers and stakeholders to realize the value of, and better understand natural and social science insights; provides managers with better insights into novel techniques for addressing their day-to-day problems; and helps scholars have a better sense of existing policy constraints and opportunities and why they exist.

These approaches are likely to be more challenging, more time-consuming, and slower to "bear fruit" than more traditional strategies of publishing scholarship and hoping it has influence. But they offer the promise of ~~allowing~~ scholars ~~to have~~ significantly more influence than they would otherwise. Such strategies also require scholars to think carefully about how they maintain their scientific impartiality and credibility while improving their policy-relevance, what Stephen Schneider has called the "double ethical bind" of being politically effective while being scientifically accurate and honest (Russill 2010).

Acknowledgment

Peter Haas recognizes the Wissenschaftczentrum Berlin for support during early work on this chapter. Our thanks to Clay Morgan of MIT Press for assisting with our publications database.

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