

Environmental Governance in a Patchwork World

Bridging Scales and Divides in Global Environmental Assessments

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Introduction

Global approaches to environmental governance, which dominated environmental diplomacy in the 1980s and 1990s, have all but broken down in the new millennium. Humans today inhabit not “one world” but a patchwork world.¹ Even purportedly global issues, like climate change and biodiversity loss, exhibit marked regional variations in the dynamics of natural systems and processes, their intersection with human affairs, and cultural perceptions of and responses to environmental change. At the same time, the politics of globalization and terrorism have polarized world affairs across a wide range of policy arenas, including the environment, highlighting deep divisions among and within nations over the institutions and rules of emerging global governing arrangements. Little progress seems likely, therefore, toward worldwide environmental cooperation, unless new approaches can be found to bridging scales and ideological divides in environmental governance.

In this article, we suggest that one possible approach to bridging these divisions may be to reorganize the links between global environmental science and policy, placing a new emphasis on integrating across the local and the global in the conduct of international scientific assessments. Over the past decade, the advantages and limitations of both “one world” and “place-based” approaches to global environmental assessment have become abundantly clear. While global environmental models and satellite remote sensing data sets have produced enormous advances in our understanding of global-scale natural processes and systems, they have done so at the expense of blurring local heterogeneities in nature and society, distancing knowledge from people’s daily lives and cares, and making overly sharp distinctions between natural and human components of environmental change. The result is a wealth of knowledge that, while detailing the global character of many of the new environmental risks humanity faces, has all too often failed to be an effective stimulus to action. Place-based scholarship, by contrast, has made great strides toward integrating studies of nature and society, understanding the local impacts and drivers of global change, and connecting science with effective political action, but only by limiting its focus to narrow, spatially bounded regions and downplaying an integrated view of connections across scales and regions.

¹ The appellation “one world” is typically used to describe approaches that emphasize global-scale natural systems and processes as driving forces behind the need to create global-scale regulatory frameworks. The Bruntland Commission report, *Our Common Future*, is often cited as an early example (WCED 1987). The report’s summary section is entitled “From One Earth to One World,” and the report itself opens: “The Earth is one but the world is not.” The report then describes a need for people the world over to unite behind common approaches to solving environmental dilemmas.

Responding to these developments, a number of major international scientific assessments have recently made efforts to regionalize their activities. In a preliminary analysis of these efforts, we contend that there is much to recommend regionalization as a strategy for bridging the local and global aspects of environmental change. Our argument builds on the idea that scientific assessments do more than simply convey knowledge from scientists to policymakers (Miller et al. 1997; Miller 2000); they also serve an important political function as key supports for building democratic orders (c.f. Ezrahi 1990; Jasanoff 1990). In this article, we suggest that the regionalization of international scientific assessments can act to strengthen global civil society by fostering deeper engagement with environmental globalization among a wider array of groups, by strengthening regional voices in global governing forums, and by helping cultures learn to reason together about global environmental risks. In this fashion, we suggest, they may offer the potential to put global environmental diplomacy back on track toward protection of the world's ecological systems.

Regional Assessments and Global Governance

During the 1980s and 1990s, most global environmental assessments focused on the globe, with little or no systematic attention to issues at the regional or local scale. Such a focus seemed justified, given the common supposition that assessments serve primarily as conduits for communicating scientific knowledge to policy officials and, to a lesser extent, attentive members of the global public. Integrated assessment, for example, has been defined as “an interdisciplinary process of combining, interpreting, and communicating knowledge from diverse scientific disciplines in such a way that the whole cause-effect chain of a problem can be evaluated from a synoptic perspective,” so as to provide useful information to decision makers (Rotmans and Dowlatabadi 1998). For global environmental assessments, like the Intergovernmental Panel on Climate Change and the Global Biodiversity Assessment, this model of assessments has suggested a focus on efforts to communicate the nature and extent of global environmental risks to diplomats who would negotiate global policies to address issues like ozone depletion, climate change, and biodiversity loss (Benedick 1991; Bolin 1994). A key feature of these assessments has been their emphasis on the universality of such risks—risks that seemed to threaten everyone and that appeared to be most appropriately conceptualized, analyzed, and managed on scales no smaller than the planet itself (Ashley 1983; Takacs 1996; Jasanoff 2001; Miller 2004a, b).

Since 2000, by contrast, a number of prominent international assessments have begun to incorporate substantial regional components in their work. These efforts have taken a number of different forms. In its 2001 report, for example, the Intergovernmental Panel on Climate Change (IPCC) sub-divided the globe into ten geographic regions and carried out a chapter-length assessment of climate impacts and vulnerability for each (IPCC 2001). The Millennium Ecosystem Assessment, which will release its initial report on trends in global ecological systems in 2005, has developed a bifurcated strategy, including both a global assessment and nearly two dozen “sub-global” assessments that include both regional and thematic, cross-regional studies. The Global International Waters Assessment (GIWA) has approached its task from a bottom-up perspective,

seeking to produce a global assessment by carrying out watershed-scale assessments for each of the world's major river basins. The Arctic Climate Impact Assessment (ACIA) has adopted yet another approach, creating a stand-alone assessment of the vulnerability of the Arctic region to changes in the Earth's climate system, with the intent to shape both local and global environmental politics.²

For global environmental scientists, two primary logics have driven this shift. First, although key dynamics of climate change and biodiversity loss may be global, it has also become increasingly apparent that these and other global environmental risks exhibit significant local heterogeneity. Assessments like the Arctic Climate Impact Assessment—or the Alternatives to Slash and Burn Agriculture project, which focuses on tropical forests experiencing the impacts of shifting cultivation—testify to the unique natural and human characteristics of global environmental phenomena in particular locales. By adopting regional-scale approaches, assessors hope to develop more nuanced and accurate pictures of global environmental change than can be achieved with global modeling and data sets. The second logic, closely tied to the first, attributes value to regionalization as a strategy for raising concern about the global environment. By downscaling knowledge and information, assessors hope that policymakers and the public will more easily understand the importance of global environmental risks to their day-to-day activities and concerns—and thus more willingly support policies designed to prevent global change in the first place.³ Such a strategy has grown in importance among assessors as it has become increasingly clear that assessments must reach much broader audiences if they are to persuade the world's publics to support global policies to reduce environmental risk.⁴

These logics are grounded on the idea that regionalizing environmental assessments will improve the communication of scientific knowledge to policy audiences. We suspect this is true. However, such arguments remain committed to the rather narrow conception of assessments as means for communicating scientific knowledge. By challenging this conception and promoting a broader understanding of the role of environmental assessments, we want to argue that regionalizing environmental assessments, if carried out appropriately, can also improve global environmental governance by helping promote

² Considerably greater detail about the regional components of recent global environmental assessments can be found on the Internet. IPCC: <http://www.ipcc.ch>. GIWA: <http://www.giwa.net>. Millennium Ecosystem Assessment: <http://www.millenniumassessment.org>. ACIA: <http://www.acia.uaf.edu>.

³ This strategy is often primarily intended for local audiences. For example, the recent Great Lakes Regional Assessment, which focused on the impacts of climate change in the Great Lakes region of the United States, was primarily marketed to policy officials and the media in the Great Lakes region itself (Great Lakes Regional Assessment Group 2000; see also UCS 2003). However, efforts to assess the regional impacts of climate change in particular regions, including especially, small island states, high mountain environments, and the Arctic, have also been used as “canaries” to signal early warnings of climate change for global audiences (see, e.g., Cebon et al. 1998; International Arctic Science Committee 2000; IPCC 2001).

⁴ For example, despite extensive global assessments of climate change and biodiversity loss, the Kyoto Protocol and efforts to set global priorities for biodiversity conservation both failed in the late 1990s to garner widespread public support in key areas of the globe: the Kyoto Protocol in the United States, global priorities for biodiversity conservation in countries with widespread tropical forest ecosystems, including Brazil, Indonesia, and the Philippines.

democracy in world affairs. The need to democratize international institutions has been identified as a central issue in international relations scholarship in the new millennium (see, especially, Keohane 2001). This is no less true for the IPCC than it is for the World Trade Organization and World Bank. A key challenge for international scientific institutions, which frequently serve as powerful sources of authority in global governance (Miller 2004a), is to find ways to open up to and support divergent cultural perspectives on global environmental risks. Indeed, their failure to accommodate divergent views and perspectives has given rise to some of the most heated and effective critiques of global environmental assessments (see, e.g., Agarwal and Narain 1991) and has contributed to the current impasse in achieving effective decision making on issues such as global warming. We contend that the regionalization of global environmental assessments, by pluralizing opportunities for integrating science and policy, offers one potentially valuable approach to addressing this problem.

Styles of Reasoning about Environmental Risks

Our argument is built on the extensive and growing literature on cultural styles of reasoning about risk. Historians and sociologists of science have been particularly concerned in recent years with excavating the varying styles of reasoning that characterize knowledge and science in distinct historical and cultural contexts. Drawing on detailed observations of scientific practice and institutions, scholars in these fields have demonstrated that scientists and publics in different times, at different places, and in different institutions or disciplines go about the search for knowledge differently from one another. They rely on different methods and approaches, they deploy different kinds of evidence, they frame problems differently, they justify their knowledge on different grounds, and so forth. Statistical analysis differs from classification and taxonomy, which differ, in turn, from laboratory experiment, for example. Each operates according to its own rules for generating, defining, and analyzing problems, deducing conclusions, and justifying the truth of propositions (Kuhn 1963; Fleck 1979; Galison 1998; Hacking 2002).

Some of the most important practical and policy implications of research into styles of reasoning have emerged in comparative studies of regulatory policy. In her studies of chemical risk assessment and management in the U.S. and Europe, for example, Sheila Jasanoff found that U.S. and European regulators adopted fundamentally different approaches to the question of which chemicals to regulate. They relied on different kinds of research, classified expertise along different lines, and used different institutional processes to incorporate scientific knowledge into policy choices (Jasanoff 1986; see also Daemmrich 1999, 2002; Daemmrich and Krucken 2000; Parthasarathy 2003, 2004). For example, U.S. regulators classified potential carcinogens as a separate category of hazard, subject to special analysis and control. By contrast, British policy made no distinction between cancer and other forms of health risk posed by chemicals. In identifying and assessing chemical risks, U.S. regulators relied heavily on quantitative risk assessments provided by animal testing. British regulators tended to favor epidemiological studies instead, and relied on a mix of quantitative and qualitative indicators of risk (Brickman et al. 1985; Jasanoff 1986). More recently, Jasanoff has extended this work to illuminate the

distinct styles of reasoning U.S. and European officials have brought to the regulation of biotechnology (Jasanoff 1995; forthcoming).

An important aspect of Jasanoff's work is the observation that these differences are not simply random variations but rather reflect distinctive elements of national political cultures. Systematic variations among approaches to producing policy-relevant science and incorporating it into public decisions mirror deeper differences in the constitutional distribution of power (federal vs. non-federal, parliament vs. divided executive and legislative, Roman vs. common law) and in society's foundational normative commitments (e.g., to solidarity in France or to transparency in the U.S.) (Ezrahi 1990). American preferences for quantification, for example, are connected in part to American notions of bureaucracy as a neutral arbiter among competing interest groups in a plural society and in part to the idea that the rationale for agency decisions must be publicized as part of a commitment to transparent government. Mathematics provides a kind of mechanical objectivity in which following the rules offers a tool for eliminating the exercise of administrative discretion in a society that sees constraint of government power and authority as an essential element of its political infrastructure (Jasanoff 1991; Porter 1995). In comparison to qualitative assessments, which rely on expert interpretation and judgment to ascertain their meaning, quantitative assessments are also more easily converted into easily accessible, visual representations that can be circulated to the public (Jasanoff 1998).

Research on the science and politics of global environmental change reveals similar variations in how participants from different parts of the world conceptualize causal relationships, define research problems, model environmental phenomena, organize research programs, deploy expert advice, and interpret global environmental changes (Rayner 1991; Rayner 1993). For example, studies of environmental modeling reveal interesting differences in the construction of models of global environmental change and their application to policy. Differences exist in the cognitive features of the models. Computationally, regional air pollution models in the U.S. and Europe differ in the use of Eulerian or Lagrangian approaches (Farrell and Keating 1998, forthcoming). Conceptually, environmental modeling in the Netherlands often integrates social and natural processes, whereas in the United States, models of biological and physical processes tend to be entirely separate from models of economic or demographic processes. Differences also exist in the organization of environmental modeling. While the U.S. funds dozens of climate models, for example, many other countries have emphasized a single, national model.⁵

More broadly, studies of environmental conflict reveal that even basic conceptual frameworks and causal narratives for understanding environmental change may vary across cultures. A major contributing element to the polarization of world affairs and the breakdown of one world approaches to global environmental change stems from what we term *comparative globalism*—divergent cultural responses to the idea that a given policy

⁵ Comparative environmental modeling was the subject of a panel discussion at the 1997 Annual Meeting of the Society for Social Studies of Science. See, especially, papers by Leen Dresen and Chunglin Kwa (Netherlands), Paul Edwards and Myanna Lahsen (US), and Simon Shackley (UK).

issue can be understood, analyzed, and managed on scales no smaller than the globe as a whole. The idea that biodiversity loss is a global problem, for example, has been widely disputed in some communities. During the negotiation of the Convention on Biological Diversity, a number of governments rejected the idea that biodiversity constituted a common heritage of humankind, in need of global protection. Instead, they asserted sovereignty over biodiversity as a form of natural resource, owned and managed by individual nations (Miller 2003). Even when the global character of policy issues is broadly agreed upon, explanatory frameworks—and proposed policy responses consistent with those explanations—may nonetheless exhibit widely divergent underlying narratives. The Intergovernmental Panel on Climate Change, for example, has framed climate change primarily as a problem of ecological limits: anthropogenic insults to the climate, when taken on an aggregate, planetary basis, have reached a scale that is disrupting the functioning of climatological processes and systems. Many observers in the South, by contrast, dispute this framing and instead view climate change as a problem of excess consumption, primarily among the wealthy countries of the North (Agarwal and Narain 1991; Jasanoff 1993).

Pluralizing Global Environmental Assessment

Divergent cultural styles of reasoning about environmental risks pose a serious challenge for global environmental assessments. Conflicts among styles of reasoning can form the basis for powerful critiques of the credibility, legitimacy, and authority of a given assessment, as well as associated policies and governing arrangements. Global environmental assessments may inadvertently privilege certain cultural perspectives over others, leading to disaffection and disengagement on the part of those who see the problem differently. On numerous occasions, external scientific and policy audiences have challenged the norms and standards of reasoning adopted within global environmental assessments. The Bush Administration, for example, has repeatedly criticized the IPCC for not holding climate models up to sufficiently standards of proof, while others have argued that the IPCC has given too much ground to those who prefer to see demonstrable evidence of harm before acting. Similar arguments pervade U.S.-E.U. disputes over the precautionary principle in half a dozen distinct scientific and policy arenas. These disputes can significantly degrade the credibility of the assessment and the authority of global governing arrangements, thus degrading the possibility of effective global environmental policies. Indeed, arguably, an important element in the growing global backlash to globalization has been a failure of global institutions to attend to the legitimacy and credibility of norms and processes for producing, validating, and applying knowledge in world affairs, especially where such knowledge is subject to competing styles of reasoning (Miller 2004b).

First-generation global environmental assessments have had considerable difficulty taking multiple styles of reasoning on board (Jasanoff and Wynne 1998; Thompson and Rayner 1998). In their search to present a consensus, shared view of scientific knowledge about the global environment, assessments have occasionally given rise to protracted contests over different approaches to reasoning about risk. One particularly acute disagreement took place during the production of the second IPCC assessment report in

the mid-1990s. Economists tasked with monetizing the potential economic impacts of climate change adopted statistical values for lives lost consistent with measures of lifetime earnings and willingness-to-pay to avoid loss of life. The resulting figures, which valued lives in wealthy countries at an order of magnitude higher than lives in poor countries, generated considerable debate within the scientific and diplomatic communities (Meyer and Cooper 1995). Criticism of the IPCC focused on what methods of valuation were appropriate for underpinning global policy decisions and sharply differed with the chosen approach based on willingness-to-pay. The episode was widely viewed as posing a major threat to the credibility of the IPCC, especially among developing country audiences (Masood 1995). In mid-1995, the Indian Head of Delegation to the first Conference of Parties of the Framework Convention on Climate Change wrote a letter to his fellow delegates rejecting the IPCC economist's logic.⁶ Angry letters, signed by a broad spectrum of scientific and NGO leaders, denouncing the draft chapter were published in *Nature* and several major British newspapers.⁷ Ultimately, the chapter authors in question refused to alter their methodology, forcing the IPCC to publish the calculations as originally computed along with a statement repudiating them in the overview summary at the front of the assessment (Watson et al. 1995).

As global environmental assessments have added regional or sub-global components, however, they have opened up at least one potential strategy for dealing with divergent cultural styles of reasoning. Conducting multiple regional assessments minimally acknowledges that a single, global assessment often fails to address the diverse needs and concerns of people in different cultural and geographic contexts. In some cases, regional assessments have been able to go even further, helping to pluralize the styles of reasoning present in global environmental governance by allowing regional assessors freedom to adopt divergent methods and approaches. In independently organized assessments, for example, like the U.S. National Climate Assessment or the Arctic Climate Impact Assessment, regional assessors have been able to diverge sharply from the IPCC, to choose their own problem framings, evidentiary standards, methodological approaches, institutional models, and communication strategies. They have also been able to adopt their own "regional" identity, without being limited by definitions from above.

A particularly useful illustration of pluralism in assessment styles can be found in the sub-global components of the currently ongoing Millennium Ecosystem Assessment. The MA is centrally concerned with the assessment of ecosystem services or, in short, the value that humans derive from ecosystems. During their early planning stages, MA leaders opted to pursue both a global assessment and a series of sub-global assessments of ecosystem services. They also decided to pursue an open competition for the sub-global assessments, based on proposals submitted from the "regions." The competition resulted in a panoply of divergent proposals, ranging from highly localized to sub-continent in scale. Although most of the approved sub-global assessments are "regional" in a geographic sense, some, like the Alternatives to Slash and Burn Agriculture

⁶ Nath, Kamal, Indian Environment Minister and Head of Indian Delegation to the UN Framework Convention on Climate Change Conference of Parties, to Heads of Delegation, March 24, 1995.

⁷ See, e.g., T. Wakeford, et al., Letter to the editor, *Nature*, Dec. 12, 1995.

assessment, reflect thematic issues that cut across geographic regions. Even among geographically defined assessments, regional boundaries are often defined by widely divergent criteria from geopolitical boundaries (“China” and “Africa”) to natural regions (“Milne Bay”) to single natural (“Mekong Delta” and “Salar de Atacama” in Chile) and human managed (“Stockholm city park”) ecosystems. Methodologies vary widely, as well, from ethnographic and focus group approaches to remote sensing and sophisticated computer modeling.⁸

MA sub-global assessments have also sought to link their activities to divergent policy and public audiences, using different institutional settings for doing so, picking up on another key aspect of styles of reasoning. Each MA sub-global assessment must have its own governing board and sources of support, tied into local policy and political networks. Major differences in national risk assessment practices in North America and Europe stem, at least in part, from the distinct constitutional infrastructures into which science advice is being incorporated. Norms of public administration differ markedly, resulting, for example, in open, highly transparent administrative procedures in the United States compared to their relatively closed counterparts in the United Kingdom (although recent trends suggest that UK advisory committees may be opening up to some degree in the wake of scandals over BSE and other food-related crises). This can have significant impact, for example, on what kinds of evidence prove persuasive in the divergent political cultures. It is not surprising, therefore, that MA sub-global assessors have chosen very different strategies for integrating their activities into political institutions and communicating their results to policy audiences.

Connecting Global and Regional Assessments

For efforts to pluralize global environmental assessments by allowing flexibility in the design and conduct of sub-global components, a key element is what MA assessors have termed the “global/sub-global handshake”: the precise mechanisms by which the global and sub-global components of the assessment intersect. For truly stand-alone regional assessments, this may be less of an issue, although few of these are likely to occur. Although formally stand-alone, for example, the Arctic regional assessment does have informal ties to both the MA and the IPCC, which have partially shaped its emerging design. Moreover, as we will argue in the next section, there are good reasons to supplement rather than replace global assessments with sub-global components. Careful attention to the global/sub-global handshake will thus almost always be warranted.

The MA’s approach to sub-global design and conduct is relatively unique. Most global assessments with regional components have organized their global/sub-global handshake around holding regional assessors to tight standards of conduct, squeezing out competing styles of reasoning in favor of methodological consistency. Pressures to standardize can be especially strong when there is a strong push for downscaling global assessments to local scales, for comparing across regions, or for aggregating regional assessments to

⁸ Author interviews and email surveys of participants in MA sub-global assessments. Additional discussions of the MA sub-global assessments can be found on the MA website at: <http://www.millenniumassessment.org/en/subglobal.overview.aspx>.

generate a global picture of environmental change. The regional chapters of the IPCC 2001 assessment and the individual river basin assessments of GIWA illustrate cases in which regional assessments have been kept to strict methodological and procedural standards. For the IPCC, the primary logic was to maintain high scientific standards by insisting on strong peer review requirements. Assessors also desired to offer policymakers an opportunity to easily compare the impacts of climate change in different parts of the world, to illustrate in part that such impacts were shared worldwide. As a result, they insisted that regional chapters follow a standard, carefully scripted outline of topics and rely heavily on computer model simulations of climate impacts, an already highly standardized field of study that relies on a very small number of closely interconnected models (IPCC 2001). GIWA, by contrast, desires to generate global conclusions by aggregating regional data, a task vastly simplified by insisting on standardized methods within each region (GIWA 2002).

Instead of insisting on strict methodological standards, the MA has taken a different approach to its global/sub-global handshake. The differences are manifest in four areas: selection, regulation, exchange (of persons and data), and credibility. MA sub-global assessments were not planned from above. Instead, the MA initiated the process with an open call for proposals. Scientists around the world who might be interested in carrying out a sub-global assessment of ecosystem goods and services were invited to submit proposals describing what their proposed assessment designs. The MA Board then evaluated the proposals and agreed to provide seed funding and affiliation with the MA to those assessments that met a set of predetermined criteria. The primary criteria used included: (1) likelihood of obtaining primary funding for the assessment from (predominantly regional) non-MA sources; (2) commitment to assessing ecosystem goods and services in an “integrated manner”, meaning paying attention to interactions across multiple goods and services and multiple scales; (3) commitment to establishing formal linkages to policy communities, the public, and indigenous groups; and (4) commitment to participating in the MA Sub-Global Working Group.

By imposing design rules, the selection process constitutes a major element in the regulation of sub-global assessments. As discussed above, selection rules required commitment to broad norms of design and organization (e.g., demonstrated commitment from regional policy officials, both in the form of funding and participation in science-policy communication arrangements; also demonstrated commitment to the predominant conceptual framework of the MA—integrated assessment of ecosystem goods and services), without specifying the particular institutional form or methods the sub-global assessment must use to achieve those objectives. In addition, the MA has hired a staff person to coordinate meetings of the Sub-Global Working Group and provide support and assistance to sub-global assessments. Sub-Global Working Group meetings have focused, primarily, on the production of the Sub-Global Working Group Report for the global MA assessment. However, these meetings have also included opportunities to introduce the MA conceptual framework to sub-global assessors, remind them of their obligations, and encourage them to exchange ideas and methods. They have thus constituted an informal mechanism for regulating the sub-global assessments.

The third area of global/sub-global handshake has occurred in data and people exchanges between the sub-global and global MA assessments. Considerable discussion of how to facilitate such exchanges has taken place, with the MA highlighting the need for bi-directional exchanges of data and people, bringing ideas and information from the sub-global assessments to the global assessment and vice-versa. The bulk of such exchanges are expected to occur in the final year of the MA process, as both the global and sub-global assessments are brought to completion. Exchange has also been hampered somewhat by the relatively simultaneity of both components, with the result that few results have been available for exchange. It is thus too early to evaluate this aspect of global/sub-global interaction, except to note its importance for how the global and sub-global assessments intersect. The potential for such exchanges may also grow down the road, especially if the MA continues on to a second or third assessment cycle. In that case, data from completed sub-global and global assessments in previous cycles can serve as a baseline for future work at all scales.

Finally, the MA has paid considerable attention to how the global/sub-global handshake affects the credibility of both components. On the one hand, the global MA has drawn on its influence and authority in global environmental governance in providing support for sub-global components. By being part of the MA, sub-global assessors have been able to raise their profile in regional policy contexts. The Southern Africa assessment, for example, was able to successfully affiliate with a major policy initiative for the region: the New Economic Partnership for African Development. Numerous sub-global assessments have been able to raise funds more effectively as a result of their participation in the MA. At the same time, the MA's approach to sub-global assessments has generated considerable enthusiasm, engagement, and credibility for the global MA at regional and local scales. Participation in MA activities and events is significantly larger and includes a different mix of participants than with the IPCC, for example. MA sub-global assessments have effectively become not only exercises in regional styles of reasoning about ecosystem change but also avenues for dialogue between regional communities and a global environmental assessment body.

In parts of the globe where the MA does not have a formal sub-global assessment taking place, MA leaders have pursued a parallel approach to strengthen regional-to-global communication. In over thirty countries, the MA has established what it calls "user forums" in which various policy and economic actors are brought together on a regular basis to discuss the MA. In each case, a local coordinator (individual or organizational) was first identified, who was subsequently responsible for identifying both the rest of the participants as well as the precise modalities and activities of the forum. Like the sub-global assessments, user forums have been given considerable flexibility to adapt the forums to what "emerges organically in each country," and the resulting forums have taken divergent forms across different countries.⁹ In some countries, for example, the forums have taken a strongly technical form, with heavy participation from scientists and mid-level managers from government and the private sector; in other, the forums have focused on high-level leadership from the government, NGOs, and indigenous groups. As

⁹ Author interview with Nicholas Lucas, 2003; information about the MA's user engagement strategies can be found on its website at: <http://www.millenniumassessment.org/en/partners.users.aspx>.

the MA progresses, a careful, comparative analysis of the sub-global assessments and user forums, paying particular attention to their methodological flexibility and its impacts on issues of communication and engagement with global environmental change, will prove invaluable.

A Practical Approach to Reasoning Together in World Affairs

In the final section, we turn our attention to the broader potential significance of regionalization for global environmental governance. It is obviously too early to offer a full analysis. A large fraction of second-generation global environmental assessments, including the MA, GIWA, and the Arctic Climate Impact Assessment, are still in progress and will remain so for the next several years. A few preliminary ideas are worth contemplating, however, particularly with regard to the promise of regional assessments as tools for strengthening global civil society.

It should be clear by now that regional assessments offer significant opportunities for bi-directional communication between global and local. Many regional assessments have opted to emphasize top-down communication, like the IPCC, downscaling global knowledge and information to regional audiences, as well as imposing strict methodological standards on work conducted at a sub-global scale. This is obviously important, but may be enhanced by a more flexible approach. Preliminary analysis of the MA experience suggests that regional assessments that allow for adaptation to culturally-appropriate styles of reasoning may help promote regional learning, as communities deliberate and exchange views on global issues and rethink their perspectives in forums that aren't as politically fraught as global governing institutions. Regional assessments may also offer better opportunities than global assessments to link up global environmental governance processes to regional and local decisionmaking institutions, enhancing the potential for long-term uptake and implementation of ideas and policies. Certainly the MA's sub-global assessments and user forums have developed stronger, more formal, and more long-term connections to policy and business communities at scales other than the globe itself than the IPCC regional assessments have. Time will tell if the global MA is capable of capitalizing on these relationships to build effective communications with these same groups.

The MA experience also suggests that regional assessments, if organized flexibly, with considerable bottom-up input, may also help strengthen the representation of local and regional voices in global environmental forums. One of the major challenges of global environmental governance, to date, is that unitary global environmental assessments have privileged certain problem framings and, hence, potential regulatory frameworks. Voices that might have challenged those framings from legitimate vantage points might not have been heard, leading to deadlock, alienation, or backlash. Arguably, this is precisely what has happened to the Kyoto Protocol vis-à-vis both the American public and many developing country environmental activists. Pluralizing styles of reasoning within the assessment opens up the potential for a wider array of local frames of meaning and cultural interpretations not only to be heard but also to be successfully integrated with scientific knowledge and expertise, strengthening their authority on the global stage.

In thinking through the potential value of sub-global assessments in strengthening the plurality of voices in global environmental governance, it is worth noting that it is not necessary for what we label “regional assessments” to necessarily stick to explicitly regional issues or even the regional dimensions of global issues. As we noted earlier, not all of the MA’s sub-global assessments actually took the form of geographic regions; some were thematically organized, instead. Another approach, which might prove of value, could be to coordinate multiple parallel global assessments, each adopting distinct styles of reasoning. These might be geographically organized. In fact, this occurred to some degree during the 1980s and early 1990s when several nations (as well as NGOs) conducted their own assessments of ozone depletion and climate change. The centralization of global environmental assessments during the 1990s has dramatically decreased the number of such parallel assessments, a decision that might be revisited. Parallel assessments need not be geographically defined, however, although as we noted above, styles of reasoning are strongly organized at the national level, making this a “natural” scale at which to organize stylistically appropriate assessments.

The value of asking sub-global communities to develop reasoned arguments about how to proceed with global environmental governance could be substantial. Dialogue and debate among divergently framed assessments is a common and valuable feature of American environmental policy (see, e.g., Miller 2000), and arguably, it would similarly help democratize global policy institutions and processes. As we pointed out above, political scientists have argued strongly for the need for democratic reform in global institutions, often placing a Habermasian emphasis on reasoned discourse (Keohane 2001). Sheila Jasanoff has likewise highlighted the need for international institutions to promote efforts to enable people from different cultural perspectives to learn to “reason together” in international regulatory and standard-setting processes. She defines reasoning together as efforts to find common approaches to conceptualizing and analyzing environmental change that can bridge culturally divergent styles of reasoning (Jasanoff 1998; Jasanoff forthcoming).¹⁰

Arguably, regional assessments offer one practical approach to learning to “reason together” about global environmental risks. The ACIA, for example, is clearly intended as a device not only to help local communities in the Arctic region learn about climate change but also as an effort to communicate the region’s vulnerability to climate change to a global audience. The problem with independent assessments like the ACIA, however, is that they tend toward “place-based” approaches that are geared solely toward local knowledge and action. For reasoning together to occur, in Jasanoff’s model, cultural styles of reasoning must be brought into regular dialogue that promotes mutual understanding and exchange of approaches and ideas. The ACIA accomplishes this to some degree, by bringing global environmental modelers into dialogue with local communities in the Arctic. Other communities are not involved, however.

¹⁰ The phrase civic epistemology refers to the constellation of norms, processes, and institutions involved, in a given society, in the production, validation, and application of policy-relevant knowledge. For a more extensive elaboration, see Miller forthcoming.

Here, again, the MA offers useful subject for analysis. A key facet of the MA sub-global assessments is the collective participation of regional assessors in the MA Sub-global Working Group. This group meets regularly, is facilitated by a central coordinator at the MA headquarters, and is tasked with producing a sub-global report as part of the MA's publication strategy. Both the sub-global meetings and report emphasize dialogue and exchange among competing methodologies, approaches, and institutional arrangements as a key element of the Sub-global Working Group's structure. A preliminary outline indicates that a variety of comparative analyses and efforts to identify best practices from among competing methodologies is a key goal of the sub-global assessment report. Facilitating stronger dialogue between the sub-global and global components of the MA has also occupied an important place in the discourse of the Sub-global Working Group, and a number of efforts have been made to facilitate exchanges between the MA's sub-global and global participants.¹¹

To be sure, the MA approach has a number of weaknesses. Perhaps the most significant is that mutual learning and dialogue among assessors may not extend more broadly to policy and public audiences, who are not a party to the exchange. To what degree this hampers broader efforts for cultures to learn to reason together is an important question for subsequent analysis of the MA approach. More mundanely, the tight timelines for the MA global and sub-global assessments have stretched sub-global assessors, who received little funding from the MA, except in a few cases, very thin. Whether the Sub-global Working Group can succeed in carrying out thoughtful and informative comparative work, while still struggling to finish their individual regional assessments, remains a major question. There is also a danger that regionalization can go too far. Some of our interviewees suggested that follow-on assessments to the first MA cycle could simply build up a global assessment out of regional components.

The problem with such an approach is that the incentives to encourage reasoning together fall by the wayside rather quickly in the absence of a formal global environmental assessment. The absence of a global assessment would thus likely leave policymakers without guidance on how to form global policies and downplay elements of environmental change that link multiple regions. Our argument in this paper should be understood not in terms of replacing global environmental assessments with regional counterparts but rather in terms of re-organizing global environmental assessments to recognize that they are not simply conduits for scientific information, but also exercises in learning to reason together about global environmental change. Supplementing global environmental assessments with regional components that help enable a plurality of styles of reasoning about global environmental risks to be heard in global environmental governance offers one approach to doing that.

Conclusion

Regionalization of global environmental assessments is hardly likely to serve as a panacea for overcoming the geopolitical and geographic divides that haunt global environmental governance at the dawn of the 21st century. Their push toward conceptual

¹¹ Author interviews with and email surveys of MA Sub-global Working Group leaders and participants.

and methodological pluralism is likely to spark resistance among those who see the current impasse on climate change and biodiversity loss primarily in terms of either a failure by scientists to effectively communicate the true extent and consequences of global environmental risks or the unwillingness of political leaders and public to undertake necessary economic, social, and policy reforms. The added cost and organizational complexity of conducting not one but possibly dozens of assessments is also likely to deter all but a handful of global environmental assessments from investing heavily in regionalization. The MA, for example, has devoted only a tiny fraction of its budget to the actual conduct of regional assessments, and comes out looking only somewhat better when one adds in the money spent supporting the coordinating activities of the Sub-Global Working Group.

Regionalization does offer an interesting line of thought and analysis, however. Three points, in particular, are worth noting in conclusion. First, consideration of the potential advantages of regionalization highlights the degree to which global environmental assessments, however organized, form a central element in the civic epistemology of an emerging global civil society. By this we mean that they are key components of the social processes and institutions by which an emerging global civil society produces, validates, and puts knowledge to use in making collective choices on behalf of the planet as a whole. Global environmental assessments thus not only make knowledge, but they develop norms of legitimacy and proof by which such knowledge is judged. As such, they are inherently political as well as scientific exercises, and it is worth considering that fact in assessment design and practice. More specifically, the trend toward regionalizing assessments highlights that global civil society remains highly pluralistic and that at least some in the assessment community have seen the value, if not the necessity, of speaking to that audience with a plurality of approaches, methods, and organizational arrangements.

Second, the trend toward regionalization indicates that global civic epistemology remains in flux. Hardly a surprise, we know. Given the rapid flux in which most global governing arrangements have found themselves over the past decade, it scarcely comes as much of a revelation that the structure and management of international scientific assessments are also shifting. Nor is regionalization the only area of experimentation in assessment design and practice. Numerous recent assessments, including both the ACIA and the MA, have made major efforts to engage with indigenous knowledge and indigenous groups. Another experimental approach pioneered by the MA has been to shift from an intergovernmental (multilateral) to a multi-sectoral governance structure for the assessment. Early indications suggest that this has at least initially weakened the MA's ties to governments but dramatically increased its ties to the non-governmental and industrial sectors. Like regionalization, these innovations too should be subjected to careful review and analysis over the next several years.

Finally, we think it is worth emphasizing that design matters in shaping the influence of regional environmental assessments in global civil society. Historically, science has had a profound and important impact on the emergence of strong civil societies, across a wide range of social and historical contexts. A number of illuminating case studies from the

19th and 20th centuries can be found in *Science and Civil Society*, the 2002 volume of the journal *Osiris*, edited by Thomas Broman and Lynn Nyhart. The details of just how science has been put to use fostering democratization vary widely across countries and time periods, however. Flexibility will be important, in designing individual regional assessments, in linking science and policy across multiple scales of human and natural order, and in identifying ways of nurturing dialogue and exchange among the diverse cultures and voices that constitute humanity.

References

Agarwal, Anil, and Sunita Narain. Global Warming in an Unequal World. New Delhi, India: Center for Science and the Environment, 1991.

Ashley, Richard. "The Eye of Power: The Politics of World Modeling." International Organization 37(3): 495-535.

Benedick, Richard. Ozone Diplomacy: New Directions in Safeguarding the Planet. Cambridge, MA: Harvard University Press, 1991.

Bolin, Bert. "Science and Policy Making," Ambio 23(1): 28, 1994.

Brickman, Ronald, Sheila Jasanoff, and Thomas Ilgen. Controlling Chemicals: The Politics of Regulation in Europe and the United States. Ithaca, NY: Cornell University Press, 1985.

Bruce, J. P., et al. Climate Change 1995: Economic and Social Dimensions of Climate Change. Oxford: Oxford University Press, 1995.

Cebon, Peter, et al. A View from the Alps: Regional Perspectives on Climate Change. Cambridge: MIT Press, 1998.

Daemmrigh, Arthur. "Biotechnology, Competitiveness, and the Regulatory State." In Stephen Silvia, ed., Reversal of Fortune? Economic Studies Program Series, Vol. 5, American Institute for Contemporary German Studies, Johns Hopkins University, 1999.

Daemmrigh, Arthur. "A Tale of Two Experts: Thalidomide and Political Engagement in the United States and West Germany." Social History of Medicine 15(1):137-158, 2002.

Daemmrigh, Arthur, and Georg Krucken. "Risk versus Risk: Decision-making Dilemmas of Drug Regulation in the United States and Germany." Science as Culture 9(4): 505-533.

Ezrahi, Yaron. The Descent of Icarus: Science and the Transformation of Contemporary Democracy. Cambridge, MA: Harvard University Press, 1990.

Farrell, Alexander and Terry Keating. "Dissent and trust in assessment processes: A comparison of OTAG and LRTAP." In A. Farrell and J. Jaeger, eds., The Design of Environmental Assessments. Washington, DC: Resources for the Future. Forthcoming.

Farrell, Alex, and Terry J. Keating. "Multi-Jurisdictional Air Pollution Assessment: A Comparison of the Eastern United States and Western Europe." Belfer Center for Science and International Affairs (BCSIA) Discussion Paper E-98-12. Cambridge, MA: Environment and Natural Resources Program, Kennedy School of Government, Harvard University, 1998.

Fleck, Ludwig. Genesis and Development of a Scientific Fact: Introduction to the Theory of the Thought Style and Thought Collective. Translated by T. J. Trenn and R. K. Merton from the German of 1935. Chicago: University of Chicago Press, 1979.

Galison, Peter. "Judgment Against Objectivity," in C. Jones and P. Galison, eds., Picturing Science, Producing Art. Routledge: New York, 1998.

Great Lakes Regional Assessment Group, Preparing for a Changing Climate. The Potential Consequences of Climate Variability and Change. Great Lakes Overview. Ann Arbor, Michigan: University of Michigan, October 2000.

Hacking, Ian. Historical Ontology. Cambridge: Harvard University Press, 2002.

International Arctic Science Committee. Arctic Climate Impact Assessment. Report on the 3rd Meeting of the Assessment Steering Committee and a Scoping Workshop. 2000.

Jasanoff, Sheila. Risk Management and Political Culture. New York, NY: Russell Sage Foundation, 1986.

Jasanoff, Sheila. The Fifth Branch: Science Advisers as Policymakers. Cambridge, MA: Harvard University Press, 1990.

Jasanoff, Sheila. "Acceptable Evidence in a Pluralistic Society." In Acceptable Evidence, edited by Deborah Mayo and Rachele Hollander. Oxford, UK: Oxford University Press, 1991.

Jasanoff, Sheila. "India at the Crossroads." *Global Environmental Change* March (1993): 32-51.

Jasanoff, Sheila. "Product, Process, or Programme: Three Cultures and the Regulation of Biotechnology." In Resistance to New Technology, edited by M. Bauer. Cambridge, UK: Cambridge University Press, 1995.

Jasanoff, Sheila. "The Eye of Everyman: Witnessing DNA in the Simpson Trial." Social Studies of Science 28(5-6): 713-740, 1998.

Jasanoff, Sheila. "Image and Imagination: The Emergence of Global Environmental Consciousness." In Changing the Atmosphere: Expert Knowledge and Environmental Governance, edited by Clark Miller and Paul Edwards. Cambridge, MA: MIT Press, 2001.

Jasanoff, Sheila. Designs on Nature. Cambridge: Harvard University Press. Forthcoming.

Jasanoff, Sheila, and Brian Wynne. "Science and Decisionmaking." In Human Choice and Climate Change: The Societal Framework, edited by Steve Rayner and Elizabeth Malone. Columbus, OH: Battelle Press, 1998.

Keohane, Robert. "Governance in a partially globalized world: presidential address, American Political Science Association, 2000." The American Political Science Review 95(1): 1-13, 2001.

Kuhn, Thomas. The Structure of Scientific Revolutions. Chicago, IL: University of Chicago Press, 1963.

Masood, Ehsan. "Temperature Rises in Dispute Over Costing Climate Change," Nature 378, 30 Nov. 1995.

McCarthy, James, et al. Climate Change 2001: Impacts, Adaptation, and Vulnerability. Oxford: Oxford University Press, 2001.

Meyer, Aubrey, and Tony Cooper, "Ten-to-One Against: Costing People's Lives for Climate Change," The Ecologist 24(6): 204-6, 1994.

Miller, Clark, Sheila Jasanoff, Marybeth Long, William Clark, Nancy Dickson, Alastair Iles, and Thomas Parris. "Shaping Knowledge, Defining Uncertainty: The Dynamic Role of Assessments." In A Critical Evaluation of Global Environmental Assessments: The Climate Experience, edited by GEA Project. Calverton, MD: CARE, 1997.

Miller, Clark. "The Dynamics of Framing Environmental Values and Policy: Four Models of Societal Processes," Environmental Values 9: 211-233, 2000.

Miller, Clark. "Knowledge and Accountability in Global Governance." In M. Tetreault and R. Teske, eds., Partial Truths and the Politics of Community. Charleston: University of South Carolina, 2003.

Miller, Clark. "Climate Science and the Making of a Global Political Order," In S. Jasanoff, ed., States of Knowledge: The Coproduction of Science and Social Order. New York: Routledge, 2004a.

Miller, Clark. "Resisting Empire: Globalism, Relocalization, and the Politics of Knowledge." In M. Long Martello and S. Jasanoff, eds., Earthly Politics: Local and Global in Environmental Governance. Cambridge: MIT Press, 2004b.

Pathasarathy, Shobita. "Knowledge is Power: Genetic Testing for Breast Cancer and Patient Activism in the United States and Britain." In T. Pinch and N. Oudshoorn, eds., How Users Matter. Cambridge: MIT Press, 2003.

Parthasaraty, Shobita. "Regulating Risk: Defining Genetic Privacy in the US and Britain." Science, Technology & Human Values 9(3), 2004.

Porter, Theodore. Trust in Numbers: The Pursuit of Objectivity in Science and Public Life. Princeton, NJ: Princeton University Press, 1995.

Rayner, S., ed. (1991). Managing the Global Commons. Special issue of Evaluation Review 15(1).

Rayner, S., ed. (1993). Special issue: National case studies of institutional capabilities to implement greenhouse gas reductions. Global Environmental Change. 3(1).

Rotmans, Jan, and Hadi Dowlatabadi, "Integrated Assessment Modeling," in Steve Rayner and Elizabeth Malone, eds., Human Choice and Climate Change: Tools for Policy Analysis. Columbus: Battelle Press, 1998.

Takacs, David. The Idea of Biodiversity: Philosophies of Paradise. Baltimore, MD: Johns Hopkins University Press, 1996.

Thompson, Michael, and Steve Rayner. "Cultural Discourses." In Human Choice and Climate Change: The Societal Framework, edited by Steve Rayner and Elizabeth Malone. Columbus, OH: Battelle Press, 1998.

Union of Concerned Scientists. Confronting Climate Change in the Great Lakes Region: Impacts on Our Communities and Ecosystems (2003).

World Commission on Environment and Development. Our Common Future. Oxford, UK: Oxford University Press, 1987.