CHAPTER 3

The Politics of Scale in Environmental Assessments

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This chapter argues that choice of scale in scientific assessments of environmental changes are not unambiguously defined by biophysical characteristics. Nor are they politically neutral. Actors contest spatial, temporal, and jurisdictional levels in the assessment process directly as well as through their influence on decisions about inclusion criteria for issues and sources of information, analytical methods, and rhetorical devices in communication. Moreover, choices of scale have political implications because they focus scrutiny on the activities of, and the impacts on, subsets of actors, who in turn may try to influence scale choices strategically. The power of one group of actors to alter the behavior of another group can be through directly influencing the decision making or, more subtly, through shifting the agendas or shaping the contexts in which knowledge is organized or decisions are made. On the other hand, the knowledge produced and shared through the social process of assessment may help build coalitions of interests that make collective action more likely.

This chapter examines some of the main pathways through which "politics of scale" (Brenner 2001; Cox 1998; Meadowcroft 2002; Swyngedouw 2000) are reproduced in environmental assessments. The term *environmental assessments* here means activities involving multiple

actors gathering, reviewing, synthesizing, and communicating information about environmental conditions, trends, drivers, impacts, and plausible futures with the aim of either raising awareness of a particular issue or supporting environmental governance processes already under way. Such assessments are a social process of communication and interaction that involves much more than simply "producing reports." Most environmental assessments are about local impacts of individual infrastructure development projects. Increasingly, however, environmental assessments are also being made across multiple projects, at regional, national, and international levels. A key feature of the latter is that they consider drivers, changes, and consequences that are multilevel and transboundary. These are sometimes called "strategic environmental assessments" (Fischer and Seaton 2002). It is with this latter, diverse class of assessments that this chapter is mostly concerned.

The first three sections here explore the ways in which politics of scale are expressed in the framing, conduct, and use of environmental assessments. Next is a classification of strategies and mechanisms that produce scale politics. The chapter ends by discussing the implications for the design and conduct of assessments.

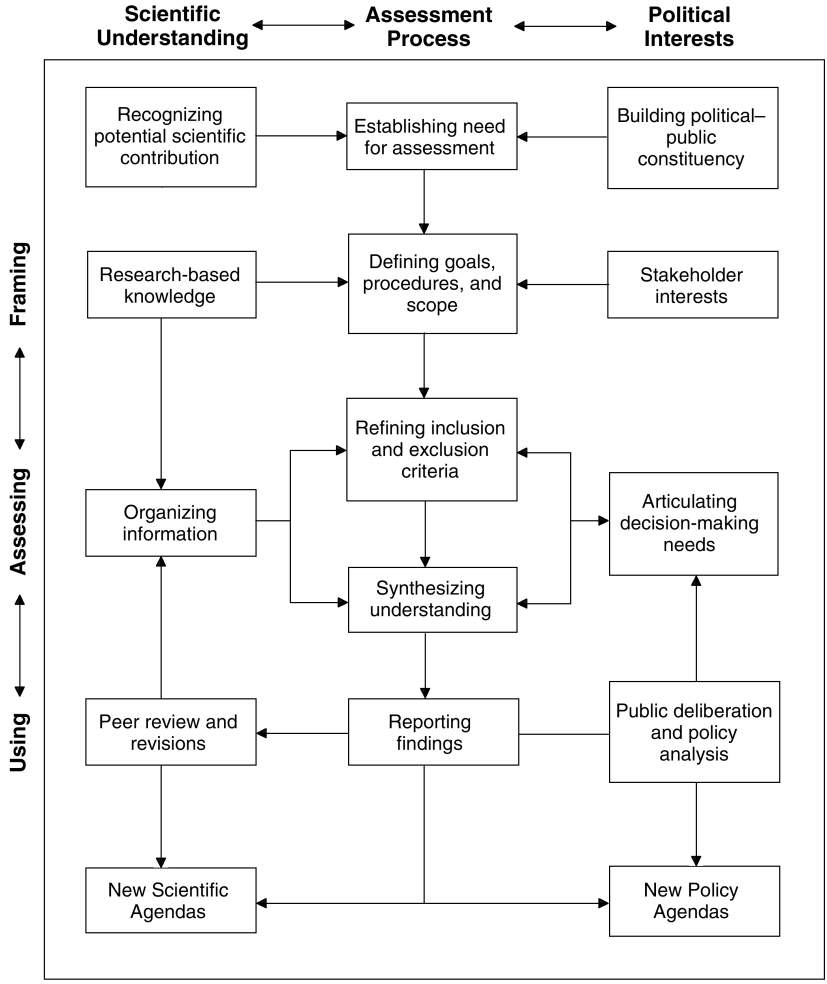
Assessments

Environmental assessments vary greatly in purpose, organization, and scope. International assessments of climate change, ozone, and acid rain have focused most on inventorying emissions, atmospheric concentration changes, and immediate biophysical impacts rather than on considering underlying drivers or socioeconomic and health impacts (Jager et al. 2001). Some of the most frequently shared characteristics of environmental assessment as a social process are summarized in figure 3.1.

This conceptual figure highlights two key points about environmental assessments. First, scientific understanding and political interests interact in various arenas (framing, assessing, and using) to produce an assessment not just at a single interface. Second, issues do not emerge and information does not flow unidirectionally through these arenas; rather, they engage in co-evolving interactions among scientists, policy makers, and the wider public that are continually reframing, reassessing, and reusing the assessment.

Figure 3.1

A schematic representation of a generalized assessment process.



Thus, decision makers do not have to wait for the final assessment to test out new policy agendas, and nor do scientists.

The analysis in this paper was guided by an initial set of questions addressing politics of scale (table 3.1). The first three groups of questions deal with the more visible and direct arenas, whereas the fourth considers the impacts of institutions in shaping what we know and the context in which assessments are carried out.

Table 3.1

Analytical framework of initial questions for exploring the politics of scale in environmental assessment

Arena	Illustrative Analytical Questions
Framing	How were boundaries, resolutions, and levels decided and defined? What rationale is given for choice of scales?
Assessing	Which sources of scale-dependent knowledge were considered, and how were they combined? Was any effort made to address potential bias introduced by choices of scale?
Using	How were the findings of the assessment communicated and incorporated into decision-making processes at different levels? Did the assessment lead to new scale-dependent policy or science agendas?
Shaping	What are the most important scale-dependent institutions shaping the knowledge system and the social context in which assessments are framed, conducted, and used? Do these reproduce scale biases?

Framing

Politics are often most intense in the initial stages when the terms of reference for an assessment are set. Even labeling an assessment as local, regional, national, international, or transboundary can be considered a political act. The framing of an assessment, including the adoption of particular spatial, jurisdictional, and temporal boundaries, matters because it entrains the types of problems that are addressed, the kinds of data sought, the methods of analysis employed, and the scope of explanations allowed.

Choices of boundaries and levels are critical because they are used to decide who is a stakeholder. Scale-dependent interests are likely to be "articulated" only if they are represented. Tightly set boundaries can ensure that off-site, higher-level interests are only weakly represented, to the advantage of local interests, and vice versa.

States, for example, are often very keen to keep assessments about large infrastructure projects at or below the national level even when transboundary impacts are likely or certain. The framing and marketing of feasibility studies for the "Thai water grid" policy, which includes significant diversion of water from neighboring regions in Myanmar and Lao People's Democratic Republic,

is a fine example of "nationalizing" a politically sensitive transboundary issue (Lebel, Garden, and Imamura 2005).

Assessments may be "internationalized" as a way of diffusing what would otherwise be perceived as direct criticism of individual nations. One consequence is to shift priorities upward to large-scale, shared changes. In assessments of health impacts from climate change in Africa, for example, participation by developing countries depends on funding. National agencies are often willing to accept the "scale" priorities of donors as they conduct their "country studies," even though these may not fit closely with needs (Ogunseitan 2003). Thus the focus of the Intergovernmental Panel on Climate Change (IPCC) on climate change–induced burdens from malaria, schistosomiasis, and dengue/dengue hemorrhagic fever get much higher priority at national levels than they would have otherwise relative to other disease burdens faced by a nation (Ogunseitan 2003). Scale choices matter because they may result in "loss of opportunities for articulating local solutions to global problems with serious local repercussions" (Ogunseitan 2003).

International assessments of air pollution issues also shift over time in the number of chemical species considered, progressively becoming more inclusive. Thus the early focus on carbon dioxide finally gave way to more comprehensive assessments and institutional responses for other greenhouse gases in climate protection long after their effects were known to science. Similarly, the early emphasis on sulfur dioxide meant that the response to other reactants important for acid deposition was delayed (Jager et al. 2001). Although these are examples of expanding causal pathways rather than simple changes in space and time, the different longevities and transport ranges of various atmospheric pollutants imply changes in scales of modeling, monitoring, and analysis.

The range of ecosystem services that are directly used and acknowledged as having important support functions depends on sociocultural contexts, which are restricted in space. As an assessment is conducted at progressively larger scales, the number of services that are fully shared among places, and thus that can be mapped "wall-to-wall," drops. The local services that would be visible in a local assessment may no longer be visible in a subglobal or global assessment. The same basic ecosystem processes (e.g., net primary production by trees) can be seen as providing different services at different scales: slope stabilization at a local scale and timber at a regional scale but carbon sequestration at the global scale.

Although space is the most easily recognized domain of scale politics, choice of time scales can also matter. If an assessment focuses on short-term concerns, then "important" goods and services are those that are already or are about to be threatened, such as freshwater resources for drinking or fuel wood supplies and food production. On the other hand, if the users are more concerned with decisions that may have consequences over time spans of several decades to centuries, then such issues as alterations to carbon balance or opportunity and resilience costs of biodiversity loss become much more important. Politicians and scientists make value judgments when setting the goals of assessments, and these often include decisions about boundaries and resolution.

Dimitrov (2003) notes that the international assessment on forest provided good information on rate of deforestation and cover as well as some understanding about causes but produced very little information about nontimber goods and services. The United Nations Food and Agriculture Organisation (1995) asserted that "it is highly unlikely that it will be possible, in the near future, to make comprehensive inventories of non-wood goods and services on a global basis."

The Millennium Ecosystem Assessment (MA) aims to assess the current status and future threats to the world's ecosystem goods and services (Millennium Ecosystem Assessment 2003, 2005). The MA is noteworthy among international assessments for the emphasis it placed, from early on, on the importance of scale—and hence on the value of attempting a multilevel assessment because the interests of many actors are scale dependent. However, the dominant logic, at least initially, was instrumental rather than normative. A multilevel assessment was desirable because such an assessment could help test the validity of up- and down-scaling exercises in global models rather than because, for ecosystem goods and services, it would be the right thing to do. The decision in favor of a multilevel analysis may itself be seen as an outcome of scale politics, where certain groups of researchers were really pushing for global-level analysis and had to concede that other levels were also crucial for an effective assessment. Having opened the door to interests and research at regional and community scales, the MA then found that issues of scale were often points of debate between subglobal assessments prioritizing issues important for their region and the global working group looking to make assessments at larger scales.

Assessing

Scale biases arise from the resolution of the instrumentation used, the density and spatial distribution of the observation networks, the scope of the mapping, the scales at which experimental manipulations are feasible and ethical, the choices of statistical methods, and the assumptions made in models. Expanding the scale of analysis to new levels (scaling up) or disaggregating vulnerabilities and impacts spatially (scaling down) also introduces scale biases.

How scale-dependent information is assembled is particularly important in assessing land use changes because these are already "value-laden" issues. A good illustration is the way various forest assessments treat swidden or rotational forest-agriculture systems. At the patch scale, a recently burned hillside being prepared for upland rice and other crops may look like a disaster site, but when moved up a spatial scale to a landscape and up a temporal scale to a decade, the practice can appear when glimpsed—and is when measured—much more benign than, for example, permanently converting forest to annual crop agriculture, at least in terms of maintaining biodiversity and ecosystem functions (such as time-averaged carbon stocks).

Remote sensing has become an important tool for regional and international environmental assessments. It has the advantage of providing repeatable large-scale coverage of variables that are often correlated with environmental states and, with complementary groundwork, ecosystem functions. On the other hand, the ease with which images can be obtained and processed means remote sensing is also frequently misused. Thus arguments about the data to be used for assessments often rested primarily on the data's capacity for "covering" the spatial area to be assessed wall-to-wall rather than on what indicators or measurements were really needed to determine the status of an environmental function.

Assessments regularly emphasize quantitative data strongly, a prejudice that works against insights—for example, related to gender or household security—that come from smaller-scale, in-depth case studies, rendering these insights invisible to analysis. Alternative "assessment technologies," such as rapid rural appraisal and its cousins, were in part created to empower local interests and to resist homogenizing analyses (Chambers 1997; Scott 1998). Traditional knowledge may complement and extend instrument-based observations allowing assessments to consider longer time frames necessary to capture rare disturbances (Berkes 1999). Unfortunately, however, strong prejudices within many branches of science persist against

nonconventional sources of observations even before their utility has been adequately tested (Forsyth 1998).

The power of maps (Crampton 2001) in assessments and plans is rarely critically examined, but here scale choices, resolution, and classes undoubtedly influence the information actually communicated. Evans (2004), in a study of urban regeneration in the Vincent Drive "brownfield" area near Birmingham, England, describes how the different phases of the ecological assessment produced findings that depended very much on how different land uses were classified, mapped, and visually displayed. One of the most problematic aspects of assessing environmental changes is the norms societies place on "naturalness" or other baselines used for comparison to judge and value impacts. These matter for resolution, for example, on whether different patches of vegetation in an urbanized landscape are classified as the same "ecologically" (Evans 2004), and for temporal scales, and on whether vegetation in succession after disturbance is considered "natural." Finally, Ross (1998) noted that using larger areas in an assessment (of a smaller, fixed area) means that a "smaller" proportion of people would be counted as affected. The opportunities for molding findings to fit interests are ever present.

Models are important tools in assessment and frequently get rescaled. As the ozone regime was unfolding, initial detailed grid models of the atmosphere to predict exposures important for human health were unjustifiably scaled up to develop transport models that could help assess source-receptor relationships (Farrell, VanDeveer, and Jager 2001). Like maps, models and statistics can be used to both hide and reveal scale-dependent relations. Superficial rescaling (up or down) is frequent, because technically there is nothing to stop naive or strategic users from doing so with their desktop computers and the available models.

Decision makers repeatedly demand for climate change assessments to be downscaled to the national and subnational jurisdictions for which they have some responsibility and decision-making influence. This has proven challenging, though significant progress has been made, at least at larger regional scales (Intergovernmental Panel on Climate Change 1997). On the other hand, many dubious local assessments are made using climate model outputs inappropriately scaled down, for example, for highly uncertain rainfall. These system failures can be interpreted as researchers willing to carry out work they know is dubious for money and as decision makers seeking to be seen as doing something even when they know it does not really mean anything. Policy may

demand levels of resolution that science cannot deliver. It takes honesty and humbleness to say, "We cannot do that (yet)."

Multilevel participation may be a practical way to reduce biases in assessment resulting from the failure to take into account key level-dependent knowledge and interests. The U.S. National Assessment of Possible Consequences of Climate Variability and Change was an intense $14 million, three-year assessment exercise that included sectoral, regional, and national assessments (Wolfe, Kerchner, and Wilbanks 2001). One key challenge it faced was how to elicit and make use of diverse public input effectively. Although it moderately improved stakeholder involvement, this did not necessarily mean the assessment was better or more successful as defined by conventional criteria, such as reducing technical uncertainties and influencing policy decisions. Unfortunately, the impacts of various forms of public participation on the quality of assessments and environmental decision making have rarely been studied (Rayner 2003).

Using

International environmental assessments vary greatly in how much influence they have on decision making (Social Learning Group 2001a). Part of this variation can be attributed to scale politics. For example, several international assessment about forests have not resulted in any progress toward an international forest regime, in part because cross-border consequences of changes in forest cover are poorly understood (Dimitrov 2003) and countries with substantial forest resources still left to exploit are keen to keep full control of rents flowing from harvests in their territories. On the other hand, where stakes are modest, states may be quite willing to participate in collective responses to assessments.

How assessments influence policy at different spatial scales may result more from the changes in institutional form and the capacities of authorities at the corresponding jurisdictional levels than from a direct result of the choice of geographical areas to which these apply. Systems of property right for same kinds of ecosystem goods and services may shift with jurisdictional level, reflecting practical limitations of monitoring and enforcement with expanding scales (Berkes 2002; Young 1994). Cooperation among individuals at small scales, and among collective entities like organizations or provinces at larger scales, is qualitatively different and may result in different institutional arrangements in support of collective actions (Ostrom 2003; Young 2002b). Institutional forms

are in part scale dependent, and multilevel assessments of response options must account for this.

The focal level of an assessment may not be maintained once it enters public discourse. Actors may strategically shift the scale of findings. Mass media frequently "play up" events or risks to make these seem larger in magnitude, duration, or extent, especially when they involve people with which the media's target consumers empathize. Misreporting of environmental assessments is common and is used strategically by some actors. Even without shifting claims about the scale at which an issue is framed, actors may nevertheless strategically link with other powerful actors to expand the size of their network, a process aptly described as "constructing a scale of engagement" (Cox 1998).

Vertical interplay among institutions (Young 2002a), which clearly involves a politics of scale spanning jurisdictional levels, may be influenced by, and help shape, environmental assessments. This is a common way that international assessments and regimes interact, even in the face of substantial uncertainties in the assessments. The ozone regime, for example, was formed even though at the time substantial uncertainty existed about the extent of ozone depletion—but not about the serious consequences for plants and human health (Dimitrov 2003; Haas 1992). Likewise, the RAINS (Regional Air Pollution and Simulation) model strongly influenced the Convention on Long-Range Transboundary Air Pollution regime even though it was based on uncertain data inputs, simplistic assumptions of horizontal transport, and a crude resolution of 150- by 150-square-kilometer grid cells (Dimitrov 2003; Lidskog and Sundqvist 2002). The models also produced findings on emissions at policy-relevant national level. Perceptions of neutrality, however, were extremely important. Thus assessments both shape and are shaped by changes in scale use and understanding.

Shaping

The extent and persistence of scale-dependent interests, capacities, and beliefs help explain why the politics of scale emerges repeatedly in environmental assessments. Scale-dependent interests arise with respect to the benefits received from resource flows or ecosystem services and also with respect to the exposures to involuntary risks or apportioning blame.

Scale-dependent capacities include livelihood skills and access rights to

environmental resources or other resources needed to exploit them. Critical links in social networks may also be largely constrained to particular levels; for most people, these are primarily local. Actors working at the jurisdictional levels of the nation-state often command greater resources, have better access to information, and therefore can perform better in contests over scale choice. Local government often does not have the expertise, the financial resources, or the access to do the preparatory work in making submissions or in commissioning level-relevant research. Control of the resources needed to carry out an assessment, such as funding of the secretariat, as well as access to information, avenues of political endorsement, media reporting, and participation in meetings can all influence what kind of scale-dependent information gets to the table (e.g., Goldman 2004).

Finally, scale-dependent beliefs arise both out of the networks of interaction and learning of the actors and out of the scales of direct experiences. Thus, while biophysical phenomena may often involve generalized knowledge, assessing impacts on health or livelihoods, for example, often suggests much more heterogeneous outcomes that are context specific and bound to local-level understanding.

The existence of "global" assessments on climate change, biodiversity, and now ecosystem goods and services reflects not just the realities of widespread, cumulative, and interactive changes in the "Earth System" but also the power of the earth system discourses (Adger et al. 2001; Dryzek 1997). The skills with which important processes of change have been identified have led to regular explicit and implicit calls for planetary or earth system management (Sachs 1993)—that is, that the "proper" scale (for management, or decision making) is global, beyond the nation-state. If misapplied, the global change discourse can be too strong and can displace policy attention about serious problems of environmental change at much smaller scales—such as securing clean drinking water and eliminating exposure to local air pollution in and outside the home, both common and hugely important problems for health in the developing world. On the other hand, an alternative discourse within global environmental change research recognizes the cross-scale and multiscale nature of these changes and the dangers of prioritizing those processes that a group of researchers or a discipline happens to study at the expense of others. Rather, global environmental change here is seen as an important confounder of what are already important processes at regional and local scales (Tyson et al. 2002).

Scale-dependent interests, capacities, and beliefs lay the foundations for actors to adopt different strategies—cooperative and resistive—in engaging scale politics (table 3.2). When combined, these two strategies produce additional strategies: bundling and merging scales.

An excellent example of shifting upward is the way the director of the World Health Organization's Roll Back Malaria initiative effectively used global warming impact assessments on the spread of malaria risk to the northern states as a way of securing financial support for essential malarial control programs in Africa (Ogunseitan 2003).

Opponents of large dam projects in Thailand and in the Mekong Region have been quick to latch onto larger-scale assessments and institutional processes. The World Commission on Dams report (2000) provided guidelines for approaches to negotiation at the appraisal stage. It could thus be argued that this report has had an impact on the Pak Mun dam politics in Thailand, as it was one of the eight highlighted case studies in the report.

Similarly, international-level climate change and ozone assessments have helped legitimize national-level assessments (Jager et al. 2001). Typically, new knowledge provided by an assessment can help interests to form by at least two pathways (Dimitrov 2003). First, it can provide information that allows actors to make improved strategic calculations about how to maximize their own benefits. Second, it can expose, across levels, shared interests that were not formally perceived.

International networks of scientists exchanging data and visiting one another's laboratories and field sites can make it very difficult to control or manipulate the scientific information that goes into assessments, should anyone wish to do so (Haas 1992). In the cases of both ozone and forests, powerful actors have not successfully suppressed or manipulated information counter to their interests (Dimitrov 2003). Scientific networks provide credibility to the political processes in environmental assessment by increasing the consensus at the international level.

This brings us to the last, and undoubtedly most uncomfortable, class of mechanisms by which politics of scale unfold: through shaping the knowledge systems and the contexts in which assessments are defined and conducted. Here the first question to ask is: what is not assessed at a particular level and why not?

Here is one example to illustrate the idea. Consumption growth, the ultimate driver of cumulative environmental changes at multiple levels, has not received

Table 3.2

Actors' strategies and their institutional contexts in engaging the politics of scale in environmental assessments

Strategies	
Rescaling to interest	Actors shift issues and analytical methods down/back or up/forward levels along a scale in ways that support or protect their own interests—for example, toward levels where they have greater capacities from access to or control of resources, or away from levels that would associate them with blame.
Rescaling to beliefs	Actors shift scales to fit their beliefs (about causes, changes, or consequences) that, in turn, have been shaped by formal and informal institutions with all their inherent scale biases, whether disciplinary, political, ideological, or cultural.
Rescaling to capacities	Actors shift scales where the issue is considered to fit the levels at which they have the greatest influence on negotiations—even if their interests are at another level.
Bundling to conceal	Actors bundle more difficult (e.g., controversial) issues from other levels with easier issues at their preferred level in the hope that the more difficult issues will then be "accepted" by others with less scrutiny or so that actors can be seen to negotiate on one level without having to "trade" at another.
Merging for consensus	Actors in assessment processes are frequently under pressure to reach consensus. Those with the most at stake, such as coordinators, may thus push for narrowing the scope to levels for which consensus can be reached by dropping controversial levels.

anything like the sustained attention given to population growth. Impacts of consumption growth conveniently stop at the edge of the farmer's field, and drivers of consumption growth travel no farther than the first market. But many of the key environmental changes are driven by consumption growth for products that are traded and consumed in distant locations (Lebel 2004; Princen,

Maniates, and Conca 2002). From the point of view of environmental assessments, this is a critical rescaling because it means that the stakeholders with interests in the resources, in the driving environmental changes, and in the response options have become multilevel. Developed countries have strong interests in keeping the analysis local with respect to commodity networks and distant with respect to *places with problems.* And they have pushed this strategy successfully: studies of deforestation, desertification, and other forms of land degradation in developing countries abound, but the key driver is invariably identified as excessive population growth. Environmental and poverty assessments in developing countries thus often end up targeting population policies. This targeting has been driven largely by an underlying reasoning whereby differences in competitive human fertility are seen as a threat to the long-term dominance of those developed economies (and, more pointedly, to the currently dominant or powerful ethnicities or races in these economies).

Funding agencies influence what scientists research. The scale specificity of this role for environmental issues varies over time and among players. This is most visible in the rises and falls for the support of international collaborative research on environmental risks, and in the difficulties faced by traditional science funders in handling studies into nonconventional knowledge, whether local, indigenous, or tacit. Nolin's comparison (1999) of national climate change research in four countries belonging to the Organisation for Economic Co-operation and Development is telling. He shows that once the reality of climate change was accepted and then placed on the policy agenda, funding for additional climate-oriented research, as per IPCC Working Group I, stabilized and maybe even fell. Overly successful communication can undermine a researcher's interests.

Much funding for global environmental change research—for example, from the Global Environmental Facility or the U.S. Country Studies Program—focused initially on emission mitigation, even in developing countries with relatively trivial cumulative contributions to the greenhouse gas emissions and where their needs were much more strongly related to vulnerability and adaptation measures. Mitigation issues are clearly global level, whereas those of adaptation and vulnerability are invariably constructed more usefully at the more local levels of states, provinces, and communities. Developing country partners play along with these irrelevant frameworks in return for financial support.

Formal and informal institutions shape what we know and what we think we need to know about scale in environmental assessments (Lebel et al. 2004).

Implications

Science and policy interact in framing, assessing, and using environmental assessments, and in each phase politics-of-scale issues arise with respect to the use and influence of knowledge. Consideration of scale-dependent interests, capacities, and beliefs—viewed through the lens of the politics of scale—support and extend several key generalizations that have emerged from comparative studies of global environmental assessments (Jasanoff and Wynne 1998; Social Learning Group 2001a, 2001b).

First, assessments are best conceived as social processes involving learning, coalition building, bargaining, and negotiation among researchers and decision makers across levels (Selin and Eckley 2003). Second, assessments handling cross-scale issues are most effective when they are perceived by participants as salient, credible, and legitimate (Social Learning Group 2001a). Third, assessment must engage with the scale-dependent understandings and capacities that lie at each level and must recognize the potential of boundary organizations to enhance the sharing of understanding across levels (Cash 2000; Cash and Moser 2000; Guston 2001; Young 1994).

The knowledge-governance interface is multilevel and multicentered. Environmental assessments are an increasingly important platform at this interface, which irregularly opens and closes to nonstate actors.

Multiple levels will often be highly desirable because, a priori, "the" appropriate spatial level is not known by ecologists, nor is the appropriate jurisdictional level known by social scientists. Key ecological processes may be level dependent or multilevel dependent, so obtaining information from multiple sources and analyzing it may provide a more precise understanding of a phenomenon at the focal level of interest. Because the spatial distribution of the social impacts may differ from that of the environmental impacts, a single-level or single-boundary definition may be misleading. A multilevel strategy also needs to be flexible; the choices of level may have to be modified and renegotiated over time as understanding and perceptions of causes, changes, and impacts change. Because governance arrangements at different levels do not function the same way (Young 1994), their requirements from assessments are also likely to differ. Thus multilevel assessment efforts are increasingly valuable to the realities of multilevel decision making.

Multilevel representation helps counteract the loss of legitimacy from single-level consideration of an issue, even if an assessment has a particular

focal level of interest to which it must report. Effective representation will usually require providing special assistance or access channels to participating minorities and vulnerable people—to articulate needs, to contribute understanding, and to help with interpreting findings.

On the other hand, creating new levels for an assessment may be counterproductive or cause conflicts that prevent a needed assessment from proceeding. A well-framed assessment may have to exclude some levels of analysis to proceed. Actors, including assessors, however, should always be challenged to justify their scale positions and the scale choices made in assessments. Transparency in scale choices improves legitimacy because all actors start from a shared understanding of scope and assumptions and thus can challenge the choices if they are inappropriate.

Shifting to a multiple-level assessment does not remove scale politics. On the contrary, it can be expected to empower actors who can work effectively at multiple levels. Among these, we should not be surprised to find wealthier, better-educated, and more mobile international scientists and diplomats.

Centralized assessment processes, as in the early phases of IPCC, have served us well for understanding large-scale environmental changes but have been less help in supporting national and more local decision making to assess vulnerabilities and mitigation actions (Jasanoff and Wynne 1998). Ultimately, distributed systems of research, assessment, and management—such as the Pacific ENSO Applications Center, which partners the U.S. National Oceanic and Atmospheric Administration with Pacific Island climate agencies to develop and disseminate ENSO (El Niño/Southern Oscillation) forecasts (Cash 2000)—may better deal with multilevel issues (Cash et al., forthcoming).

International environmental assessments do not have to formally engage states. Indeed, avoiding processes of formal endorsement by government may allow assessments to address issues that would otherwise get bogged down in diplomatic battles of blame and counterblame. The World Commission on Dams, for example, set global standards without special reference to states, allowing highly sensitive national and transboundary issues of water infrastructure to at least be addressed (World Commission on Dams 2000).

In the future, citizen-led assessments calling on scientific experts to review and synthesize information according to their own terms of reference are likely to become more common. These assessments will often shift the focal level of interest downward to levels closer to those people experience in normal social

interactions. A tough issue for localized assessments is how to downscale or place-transpose science done at lower resolution or elsewhere in a way that does not destroy the credibility of the assessment. Regardless of which levels are considered, the key is that legitimacy comes from the discursive interactions, not just from the formal endorsement of governments (Dryzek 1997).

The proliferation of national and international environmental assessments—perhaps relabeled as "integrated" or "sustainability" assessments—will likely continue. A knowledge system that encourages multiple competing research and development efforts and that allows alternative models and analyses to continually arise and compete for explanatory space is likely to be more robust. Similarly, assessments should encourage independent evaluations at different levels of the assessment process and use the output products in ways that facilitate social learning across levels and assessment exercises. Unfortunately, one of the likely side effects will be *assessment fatigue,* whereby more and more of the tired researcher's time is taken away from those observations and analyses needed to form the foundations of a credible environmental assessment.

Conclusions

Four messages arise from this chapter's consideration of the politics of scale in environmental assessments. First, scientists, policy makers, and citizens involved in environmental assessments should not be allowed to make scale choices secretively, because these choices matter too much. Rationale, criteria, and assumptions related to scale and level decisions need to be made transparent. Second, major uncertainties about scale dynamics and response options still exist for many pressing issues about the environment. Hence, it makes intuitive sense to start with the assumption that a multilevel assessment may be needed while also recognizing that this does not eliminate scale politics.

Third, many other important issues of governance that should be addressed in environmental assessments are not restricted to issues of scale—including politics of place and position as well as more general issues of transparency, accountability, representation, and responsibility. A politics of space and scale out in the open is usually a good sign for society, not a bad one.

Fourth, and more sinisterly, much of the politics of scale has been like a play of shadows, shaping the appearances of what is studied and assessed. Although

scale negotiation clearly matters for the design, conduct, and outcome of environmental assessment processes, this does not mean that assessments can be rescaled with impunity. Biophysical processes have complex scale realities that society can misunderstand, or choose to ignore or distort for a while, but history tells us that ecosystems have a way of coming back to remind us of our past.

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