SCOPE 27 - Climate Impact Assessment

Kates, R. W., J. H. Ausubel, and M. Berberian (eds.), 1985. Climate Impact Assessment: Studies of the Interaction of Climate and Society, ICSU/SCOPE Report No. 27, John Wiley.

Part IV Integrated Assessment

Studies that combine several links in the chain of sensitivity studies, biophysical impact studies, social and economic impact studies, and adjustment responses are integrated assessments. Examples of integrated assessments and problems of linkage between types of studies are found throughout the volume. Part IV explores in depth one major technique for providing linkage in integrated assessment —the use of modeling and simulation. In addition it reviews the experience with both historical and recent integrated assessment.

Integrated assessments involve a scale of activity and a set of complex linkages that encourage the use of modeling and simulation techniques. Such techniques provide an orderly and systematic way to store and analyze large arrays of data, to link data sets together, and to translate different disciplinary approaches into common mathematical language. A special attraction lies in the parallelism with general circulation models (GCMs), the favored tool for exploring dynamics of climate at a global scale. These models, representing the apogee of causal explanation, scale of detail, and massive data handling and computation requiring the most sophisticated of computers, establish a criterion for modeling towards which many biological and social scientists working on integrated assessment seem irresistibly drawn. Thus the opening chapter of Part IV begins with an exploration of global modeling and simulations (Chapter 18).

In Chapter 18 Robinson examines some twenty global models for their potential in climate impact assessment use. She is cautious in her conclusions. Global social, economic and environmental models have not been designed for climate impact analysis, are at best pioneering efforts, and are difficult to use. Nonetheless they can provide insight, data and answers to restricted questions. The pioneering quality of global models is demonstrated by the coevolution biosphere model of the Computing Center of the USSR Academy of Sciences Moisseiev, Svirezhev, Krapivin, and Tarko describe their ambitious, but incomplete, integrative model of climate, ecosystem and society—a model attuned to a time horizon of centuries.

A more modest and limited form of modeling is presented by Lave and Epple (Chapter 20) under the rubric of scenario analysis. They assert three virtues of scenario analysis: stretching the imagination to encompass a wide range of actions and implications: formal modeling of the causes and consequences of climate change and potential adjustments; and interdisciplinary integration to transcend the parochialism of professional method and tradition. Scenarios, and indeed all modeling to date, appear to be exploratory tools, not to be used for reliable prediction but rather to explore the bounds of both the unusual and the possible.

Large-scale modeling is an appealing tool, but still not a broadly realized one. What, then, can be said of other efforts at integrated climate assessment? Wigley, Huckstep, Ogilvie, Farmer, Mortimer and Ingram

offer their evaluation of historical climate impact assessment (Chapter 21), considering some 24 examples of historical case studies. To do so they review extensively the methodological underpinnings of historical study, and Chapter 21 should be read jointly with the chapter on historical analysis by de Vries (Chapter 11). Wigley *et al.* note the attractiveness of historical case studies, seemingly free from the complications and confusions of oft polarized current historical explanation. But ironically they find the field suffering from polarities of a different sort, with exaggerated claims and rebuttals for the role of climate in history. Yet within the seeming excess of rhetoric, perhaps half of the studies examined handle both data and assumptions thoughtfully and carefully.

Glantz, Robinson, and Krenz (Chapter 22) examine only five examples of major assessments of climate impacts of recent or future experience, but do so in considerable depth. They focus on comparative issues of study design and length, research staff and linkages between the individual study components, and public presentation of findings. It is clear from these experiences that major climate impact assessments are substantial undertakings, requiring extensive research and time, flexibility in design, and repetition as new data and methods become available. Assessments with strong scientific leadership can advance the state of the art; those organized on a constructive basis can at best attempt only to answer the questions addressed.

The review of integrated assessment concludes with the Chinese proverb: to know the road ahead, ask those coming back. The road ahead is unfolding. In the 4 years that this volume has been in preparation a second generation of integrated studies has been undertaken, and more are planned. Some of these studies simply repeat the past, with little evidence of having sought the advice of those coming back. But most of these half dozen studies evidence a high degree of methodological sophistication, scientific clarity, flexibility in their design, and excellence in their scientific leadership. Another final chapter is being written.

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