

possible conclusion. "In legal and constitutional parlance, my resolution to the takings dilemma would best be characterized by a reliance on due process. My answer to whether compensation should be paid is, 'it all depends'" (p. 207).

This same answer applies to environmental zoning that increases housing costs. Beatley distinguishes between regulations aimed primarily at 'second homes and resort projects' and those that impede construction of affordable housing (p. 99). He also ably discusses locally unwanted land uses, such as landfills, which are good for the environment at a larger scale. A chapter on 'Ethical Duties to the Environment' summarizes differences in opinion among various movements associated with animal rights, deep ecology, ecofeminism, a Leopoldian land ethic, and assorted holistic and organismic views of the natural world. Beatley observes that both instrumental and inherent or intrinsic values are relevant to management decisions. Not even as skillful a commentator as he, however, is able to clarify how some of the more theoretical perspectives in environmental ethics can inform feasible land use policies, i.e., how positions as thoroughgoing as these can be compromised in ways that make them amenable to the processes of a political economy.

Beatley begins and ends this book with the recognition that land-use "decisions are political, of course" (p. 261), but he believes that ethical deliberation properly underlies political choices. Like many philosophers, Beatley calls for a broadening of the dominant "normative framework which *has* developed [which] is largely economic, wrongly narrow in scope, and morally indefensible for many, if not most, land-use conflicts" (p. 261). In its place, Beatley would put a much wider concern with distributive justice, the prevention of harm, the provision of basic needs, obligations to future generations, and respect for values inherent in the land community. How each of these concerns informs particular policy choices, as this book amply and ably shows us, however, 'all depends' on the details of the particular situation.

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Climate Change 1995: Economic and Social Dimensions of Climate Change. James P. Bruce, Hoesung Lee and Erik F. Haites, editors. Cambridge University Press, 1996, 448 pp., ISBN 0-521-56854-4.

This report of Working Group III of the Intergovernmental Panel on Climate Change (IPCC) is an attempt to pull together a broad range of ideas on the economic and social dimensions of climate change. An appendix is required just to list the contributing authors, who number 97, and hail from all over the world. The report is organized into a 'Summary for Policymakers', followed by 11 chapters on topics including decision-making frameworks, equity, applicability of cost/benefit analysis, damage assessment, mitigation costs, integrated assessment, and policy instruments. Each of the 11 chapters is authored by a different subgroup of contributors. There seems not to have been much interchange between these chapter authors because the chapters exhibit a significant amount of inconsistency in their basic approach, assumptions, and conclusions.

The 'Summary for Policymakers' is a well-tempered statement that glosses over much of this inconsistency. It acknowledges that "decision making related to climate change must take into account the unique characteristics of the 'problem': large uncertainties (scientific and economic), possible nonlinearities and irreversibilities, asymmetric distribution of impacts geographically and temporally, the very long time horizon, and the global nature of climate change with the associated potential for free riding" (p. 7). The difficulty is that some of the chapter authors pick up on these problems while others forget, or at least downplay, them and try to go on with analysis-as-usual.

Chapter 1 on the scope of the assessment and Chapter 2 on decision-making frameworks are excellent summaries of the problems as stated above. Likewise Chapter 3 on equity and social considerations and Chapter 4 on intertemporal equity, discounting, and economic efficiency are fairly balanced syntheses of these complex issues.

Chapter 5 on the applicability of techniques of cost-benefit analysis (CBA) to climate change is a strange mix. After a careful delineation of the differences between CBA and cost-effectiveness analysis, multicriteria analysis, and decision analysis, and a delineation of the huge number and magnitude of uncertainties and potential irreversibilities involved in climate change analysis, the authors for some inexplicable reason then lump all decision techniques under the heading of 'modern' CBA and conclude that this 'modern' CBA is indeed applicable to climate change. This bit of misdirection is like asking "do horses have wheels?" and concluding that since both cars and horses are modes of transport, therefore 'modern' horses (which include cars, trains, etc.) have wheels. The point is that CBA defined in the normal way is not well adapted to climate change studies because of the difficulty of assessing costs and benefits. Multicriteria analysis and decision analysis are better suited, but even these techniques often assume a degree of certainty in the input information that is not there. There is some limited discussion of option analysis and hedging strategies in the chapter, but I think more needs to be said about decision making under true uncertainty (when probabilities are unknown), the precautionary principle, and the democratic process, items which were brought up in Chapter 3 but not really expanded on here.

Chapter 6 on "social costs of climate change: greenhouse damage and the benefits of control," is undoubtedly the most controversial contribution. While stating that "the possibility of catastrophes (low probability/high impact events) and surprises cannot be ignored," (p. 183) it goes on to synthesize the results of several damage estimate studies that ignore these potentially catastrophic events and surprises. Caveats aside, the message that will be taken away is that "the available studies estimate damages for developed

countries at between 1% and 2% of GNP for a $2 \times \text{CO}_2$ climate" (p. 183). These estimates include a whole host of questionable assumptions whose implications are not adequately addressed in this chapter. For example, in addition to ignoring the possibility of catastrophes, they: (1) do not account for income distribution effects in either space or time; (2) assume unlimited economic growth; (3) discount the future assuming a constant, relatively large discount rate (around 5%); (4) attribute monetary values to a statistical human life based on income, which may severely undervalue the poor; (5) estimate damages to agriculture, forestry, fisheries, and natural ecosystems in very incomplete and simplistic ways, which most likely undervalue these impacts; and (6) equate GNP with welfare (even though this equation is disavowed elsewhere in the report). Different assumptions in any of these areas can significantly affect the results. For example, Azar and Sterner (1996) have calculated the effects of assuming a different pure rate of time preference and incorporating the fact that welfare change per unit change in income varies with income, thereby addressing the geographic distribution effect. The pure rate of time preference is one component of the discount rate (in addition to a 'growth' component) as described in Chapter 4 of the report. Many have argued that the pure rate of time preference should be set to 0 for long-term studies of social decision making. With a pure rate of time preference of 0% (compared to around 3% in most studies cited in Chapter 6), and correcting for income differences between countries by weighting costs by the inverse of income, Azar and Sterner calculate a marginal cost of CO_2 emissions of 260–590 US\$/ton (for a 300 and 1000-year time horizon, respectively), compared to 5 US\$/ton (regardless of the time horizon) from Nordhaus (1993), one of the major studies cited in Chapter 6. Thus, varying even these two assumptions can increase the damage cost estimates by a factor of 100, and increase it to above the 200 US\$/ton estimate given by Nordhaus (1993) of mitigation costs to achieve half of current emissions.

Given the importance of the estimates summarized in Chapter 6 to the policy process, much

more could have been said about how they should be interpreted. This is especially true in light of the alternative decision making frameworks detailed in other chapters, the unique nature of the problem stated in the summary, and the sensitivity of the answers to alternative assumptions as noted above.

The remaining chapters in the report cover response options (Chapter 7), costs of mitigation (Chapters 8 and 9), integrated assessment (Chapter 10), and policy instruments (Chapter 11). They are all of fairly high quality, given the task at hand, the time constraints, and the complexities involved. In particular, Chapter 10 on integrated assessment manages to bring up some of the things that would really be needed in an integrated assessment of climate change and that are still lacking in existing models. It is one of the few chapters that tries to expand the borders rather than merely identifying them.

In summary, this report is a landmark. But, like many landmarks, it is easily recognizable but not particularly beautiful. It managed to synthesize a huge amount of information and it will allow some critical issues to be recognized and, hopefully, analyzed more fully and from a broader perspective in the future. It suffers from uneven quality and focus and a general timidity in some of the chapters (to be expected, I suppose, in such a high profile 'committee' report). Let us hope that it serves its role as a landmark to guide the way to future research that can adequately address the unique problems of global change it has

identified (large scientific and economic uncertainties, possible nonlinearities and irreversibilities, asymmetric distribution of impacts geographically and temporally, and very long time horizons). This will require, among other things, a higher degree of integration among the various natural and social sciences. It will also require a serious application of many of the ideas that were described in some chapters of the report itself, but which were not taken up in the analyses that will have the most immediate impact on the policy process.

References

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