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Valuing ecosystem services: what's the value?

Ninan, K. N., editor. 2014. **Valuing ecosystem services: methodological issues and case studies**. Edward Elgar, Northampton, Massachusetts. xxxi + 427 p. \$144.00 (cloth), ISBN: 978-1-78195-515-4; \$144.00 (ebook), ISBN: 978-1-78195-516-1.

Key words: ecosystem services; environmental economics; environmental valuation.

Valuing environmental benefits and costs has been a major part of environmental and ecological economics for several decades, but, catalyzed by the Millennium Ecosystem Assessment (MA) published in 2005, such valuation has been increasingly framed in terms of valuing ecosystem services (ES). There is no universal definition of ES; many studies have followed the MA in equating them with the benefits provided by ecosystems, but increasingly ES are considered the intermediate and final processes within ecosystems that provide benefits to human well-being. The aims of this book, according to its cover, are to provide state-of-the-art examples of the latest valuation research on a cross-section of ecosystems and services to academics, policy makers and professionals, and to provide a blueprint for moving valuation science and practice forward.

The book includes 19 chapters, of which four (2, 5, 9, and 11) were previously published in peer-reviewed journals. The book is divided in three parts. Part one focuses on methodological issues and challenges, part two on valuation case studies, and part three on valuation and policy. The book makes a tour through a wide range of different types of ecosystems, including tropical and temperate forests, agricultural systems, urban ecosystems, and a range of coastal ecosystems including mangroves, oyster reefs, and salt-marshes. A wide range of methods is used at different scales, from local project assessments to whole-continent analyses. There is a lot of emphasis on replacement cost methods (where the hypothetical cost of artificially replacing an ES is seen as an indicator of its value), while revealed preferences methods (where values are deduced indirectly from behavior, e.g., how far people travel) are less emphasized. Approaches that integrate valuation and deliberation (which are increasingly recognized as a promising way to deal with unfamiliarity with ecosystem services by research participants and bring in broader sets of values) are not covered, as are cultural ES (apart from recreation).

The book starts off with a foreword by Robert Costanza. The foreword provides 1) a useful introduction to some basic concepts of valuation (e.g., different types of economic values) and 2) an overview of the different ways in which valuation can be used, from awareness raising and advocacy to accounting and policy evaluation. However, project appraisal, probably the policy context that valuation is used for most, is not mentioned. Unfortunately, much of the content of the foreword is then repeated in the preface and introduction by the editor, K. N. Ninan. Many of the later chapters repeat the same introductory framing based on the MA and Costanza's seminal 1997 paper (Costanza, Robert, Ralph d'Arge, Rudolf de Groot, Stephen Farber, Monica Grasso, Bruce Hannon, Karin Limburg, Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Sutton, and Marjan van den Belt. The value of the world's ecosystem services and natural capital. *Nature* 387:253–

260) which estimated the total value of a wide range of ES globally. Ninan also repeats a good deal of his introductory chapter in his own chapter on forest ecosystem services.

Chapter 2, by Ian Bateman and colleagues, which describes part of the economic methodology underpinning the UK National Ecosystem Assessment, is one of the best presented and most informative in the book. The authors take the reader by the hand through their conceptual framework and methods, in a broadly accessible, well-argued, step-by-step approach in order to assess the economic implications of land use changes in England and Wales under different scenarios. Recognizing some of the limitations of contingent valuation and cost-benefit analysis, they conclude the chapter with a discussion of how notions of critical natural capital, resilience value, and safe minimum standards might help in implementing a precautionary approach to safeguarding biodiversity and ES.

Another outstanding chapter in the book is by Vivek Shandas et al., who provide an overview of urban ES with examples from Portland, Oregon. The chapter provides a comprehensive and fascinating overview of opportunities for integrating ES into urban planning and design. It is also the only chapter to substantially consider ES within their social-institutional contexts, and how these matter to valuation. Shandas and colleagues argue that in urban planning, social systems are unequivocally the organizational focus for ES, that land and ES conservation need to be negotiated according to many stakeholder interests, and that thus an interdisciplinary effort needs to be made to understand the social forces and institutions that 1) inform the way policy is generated and 2) determine appropriate ES management interventions. In my view, these are certainly messages that environmental economists need to take to heart if valuation is to play a greater role in the messy arena of real-world policy making.

The quality of other chapters is variable. A substantial number consider the total values of ES, in part on the basis of somewhat arbitrary value transfers (where values from other places or contexts are taken from the literature). Total value approaches are largely uninformative for policy making, and environmental valuation now mostly focuses on understanding implications of a policy intervention on an ES provision. The chapters also do not include sensitivity analyses that consider how transferring different values affects end results. Although conceptual advances made around ES over recent years (such as distinguishing between human and ecological input into ES, between potential and realized ES, and between intermediate and final ES) are briefly mentioned in the introductory chapter, most chapters have not advanced much beyond the MA in terms of conceptualization. Some of the chapters describe 10 or almost 20 year-old surveys. Some services are valued using a supply-based approach (e.g., all the nutrients cycled by a forest could be sold as fertilizer) without regard to what degree these potential services actually reach beneficiaries.

Ninan could have also done a better job in terms of editing. There is too much repetition and some sections could have been clearer and better structured. Furthermore, there is little consistency among chapters in how calculations are presented; some chapters contain long lists of calculations in prose that could have been presented in a clearer format.

The absence of a synthesis chapter, which summarizes key conclusions and research gaps, left me with an unsatisfied feeling at the end, as plenty of common issues surfaced. This volume led me to the conclusion that we still lack both economic and ecological data to underpin valuations. This lack of data forced many of the authors to include sets of only remotely appropriate figures. Especially for the larger scale (national, continental, global) analyses, some of the substitutions and generalizations made are rather crude. For example, in a global cost-benefit analysis by Linwood Pendleton et al. on maintaining carbon sequestration services of seagrasses, salt-marshes, and mangroves, the authors derive opportunity costs (the foregone benefits of developing coastal habitats) from agricultural land values for arable land. These cropland data are themselves based on highly simplified assumptions, such as a constant profit margin of 30% on arable farming, due to lack of data. The authors then add another arbitrary factor to adjust agriculture values upwards by 30% for the aquaculture context, which is more profitable per hectare. Add to this the somewhat arbitrary choices that need to be made in every cost-benefit analysis—what time period is used, how much benefits and costs weigh the further away they occur in the future (the discount rate), and what aggregation function is used—and it becomes a rather messy affair. The choice of data, how they are transferred to another context, and how they are aggregated thus have a major impact on the results, but the authors bring little recognition to these issues.

Another common issue is the apparent tension between two different normative goals of valuing ES: is valuation to support nature conservation, or to advance human welfare by increasing economic efficiency? Most authors, including the editor, seem to be convinced that the two can be harmonized, but sometimes, such as in a chapter on eradicating invasive species in Montserrat by Pieter van Beukering and colleagues, economic analysis does not favor conservation action.

Beyond a minority of stronger chapters, the book does not, as Costanza asserts on the book's cover, really address the many caveats and critiques of his 1997 *Nature* paper, or present the state of the art. Also, contrary to its desired wide audience, most of the chapters are not written in a style that is accessible enough to most professionals, or, for that matter, to most ecologists. In my view, the value of this book as a compendium is limited, though elements of it will be useful for those seeking material on specific contexts or case studies.

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